



# **Jefferson Proving Ground Madison, Indiana**

## **Final Proposed Plan Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30**

*Prepared for*  
***U.S. Army Corps of Engineers  
Louisville District  
Louisville, Kentucky***

**Total Environmental Restoration Contract  
DACW27-97-D-0015 Task Order 4008**

February 18, 2004



**MWH**

MONTGOMERY WATSON HARZA

February 18, 2004

Ms Karen Mason-Smith (SRF-51)  
US Environmental Protection Agency (USEPA), Region 5  
Indiana Government Center - North  
77 West Jackson Blvd  
Chicago, IL 60604

Mr. Kevin Herron  
Indiana Department of Environmental Management (IDEM)  
Office of Environmental Response  
100 N. Senate Ave.  
Indianapolis, IN 46206-6015

Re: Final Proposed Plan  
Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30  
Jefferson Proving Ground, Madison Indiana

Dear Ms Mason-Smith and Mr. Herron:

On behalf of the Department of the Army, MWH has prepared the enclosed Final Proposed Plan for Jefferson Proving Ground (JPG). The Proposed Plan has been prepared based on the Final Phase II Remedial Investigation, September 2002 and the Final Feasibility Study, August 2003. USEPA, IDEM, and Restoration Advisory Board (RAB) comments on the Draft and Draft-Final Proposed Plan dated October 2003 and January 27, 2003 have been incorporated into this Final Proposed Plan, and comments/responses are in Appendix A5 and A6.

Based on additional review from the Army Environmental Center, the proposed cost to complete Long Term Monitoring has been extended to 20 or 30 years. This is to conform with budgeting cost in the Army cost to complete remediation actions at JPG. Sites 7/21B, 12C and 14 costs have been extended out to 20 years, and the other sites extended to 30 years to capture the full potential cost to the Army to monitor those sites. The tables in the Proposed Plan have been revised to reflect this change. In addition, Table 9 has been added to summarize Proposed Plan costs. This increase in cost does not change the proposed plan for ground water at any of the sites.

Copies of the final document are being submitted for your records. In addition, a pdf of the Final Proposed Plan is included on a compact disc (CD). This information will be put on the JPG web-page for access by the public.

Please call if you have any questions.

Sincerely,

MWH AMERICAS, INC

Bruce A. Iverson  
Task Order Manager

Enclosures: Final Proposed Plan (2 copies USEPA, 4 copies IDEM, with 1 CD to each)

cc: Mr. Brooks Evens - USACE (14 copies)  
Mr. Paul Cloud - USACE (1 copy with 1 CD)  
Mr. Ken Knouf - US Army - JPG (4 copies with 1 CD)

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**PROPOSED PLAN  
SITES 1, 2/27, 3/4, 7/21B, 9/10, 12A,  
12B, 12C, 14, AND 21A/30**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

**February 18, 2004**

MWH certifies that, to the best of its knowledge and belief, the technical data delivered herewith under contract DACW27-97-D-0015 is complete, accurate, and complies with all requirements of the contract.

Prepared by: Leslie A. Busse February 18, 2004  
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## ACRONYMS AND ABBREVIATIONS

ARARs	applicable or relevant and appropriate requirements
BIRA	Baseline Risk Assessment
BRC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COCs	Contaminants of Concern
COPCs	Chemicals of Potential Concern
FS	Feasibility Study
IDEM	Indiana Department of Environmental Management
JPG	Jefferson Proving Ground
MCL	maximum contaminant level
NCP	National Contingency Plan
NFA	No Further Action
NPDES	National Pollution Discharge Elimination System
PERA	preliminary ecological risk assessment
PRG	Preliminary Remediation Goal
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
SSA	sewage sludge application area
STP	Sewage Treatment Plant
SVOC	semi-volatile organic compounds
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
UXO	unexploded ordnance
VOC	volatile organic compound

**PROPOSED PLAN  
For  
JEFFERSON PROVING GROUND  
Madison, Indiana**

**INVITATION FOR PUBLIC COMMENT**

The U.S. Army, the Indiana Department of Environmental Management (IDEM), and the U.S. Environmental Protection Agency (USEPA) have reached agreement on the proposed remedies for the environmental restoration of those sites requiring action at the Jefferson Proving Ground (JPG), in Madison, Indiana. The Army invites the public to submit comments on this Proposed Plan.

**Comment Period:** A 30-day public review and comment period begins on February 20, 2004 and ends on March 31, 2004. All comments received during this period will be summarized and addressed in the Responsiveness Summary section of the Record of Decision (ROD) and sent to individuals who commented. The ROD is a decision document that is signed by the regulatory agencies for concurrence on the selected remedies.

**Public Meeting:** The Army will explain the preferred remedies and other alternatives in this Proposed Plan at a public meeting. There will be an opportunity to address concerns and to submit oral and written comments regarding this plan. Representatives from JPG, the Army, the U.S. Army Corps of Engineers (USACE), the USEPA, and IDEM will also be available at the meeting to answer questions.

Date: March 23, 2004  
Time: 6:30 to 7:30 p.m.  
Place: Madison-Jefferson County Area Public Library  
420 W. Main Street  
Madison, Indiana

**Comments:** Interested individuals may submit comments in writing by March 31, 2004 to:

Mr. Paul D. Cloud  
5183 Blackhawk Road, Room 286  
Aberdeen Proving Ground, Maryland 21010-5424  
Electronic Mail: paul.d.cloud@us.army.mil  
Facsimile: 410-436-1409



## **INTRODUCTION**

The U.S. Army is conducting an environmental restoration project at the JPG in Madison, Indiana. The project is being performed in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), National Contingency Plan (NCP), and related laws and policies governing the cleanup of sites potentially impaired by the presence of hazardous substances. In addition, this work will support the transfer of the JPG property to beneficial reuse in accordance with Base Realignment and Closure (BRAC) policy. A Remedial Investigation (RI) and Feasibility Study (FS) were conducted at the JPG, which was closed in 1995 under the Army's BRAC program. The RI and FS were conducted in accordance with requirements of the CERCLA.

### **Purpose and Scope**

The purpose of the Proposed Plan, prepared as part of the CERCLA process, is to condense the RI/FS reports and present and defend the preferred alternatives. The Army, as the lead federal agency, has selected the preferred remedial alternatives, in cooperation with the supporting agencies, i.e., USEPA and IDEM. The USEPA and IDEM concur with this Proposed Plan. The primary objective of the Proposed Plan is to solicit public involvement in the remedy selection process by summarizing the RI/FS reports in a clear concise manner. Following receipt and evaluation of public comments on the Proposed Plan, a ROD will be prepared.

This document consists of the following information for each of the sites requiring remedial actions (RA) (as presented in the FS) as a minimum requirement of 40 CFR 300.430(f)(2):

- Brief summary description of the impact sites and the remedial alternatives evaluated in the FS.
- Identification of the preferred alternative and the rationale supporting that preference.
- Summary of any formal comments received from the support agencies on the FS.

### **Community Participation**

The public is encouraged to review and comment on the alternatives presented in this Proposed Plan. The preferred alternative will not be considered final in a ROD until public comment is obtained and considered. At a minimum, all comments will receive an individual written response, and will be collectively included in the Responsiveness Summary section of the ROD.

Community involvement prior to issuance of this Proposed Plan, included regularly scheduled meetings with the JPG Restoration Advisory Board (RAB), which is comprised of interested members of the surrounding communities. These public forum meetings presented and discussed activities at JPG.

The Army invites and encourages the public to review all of the information gathered for JPG. The RI/FS and other pertinent documents are part of the administrative record located in Duggan Library at Hanover College in Indiana or can be viewed on the JPG website @ <http://jpg.subcom.army.mil>.

## **Facility Background**

JPG occupies 55,265 acres north of Madison, Indiana (Figure 1). Of the 55,265 acres, the RI and FS address an approximate 4,000-acre area south of the Firing Line (Figure 2). The area north of the Firing Line consists of impact areas from the testing of large munitions and is currently under the management of the U.S. Fish and Wildlife Service (USFWS).

JPG was used from 1941 through 1995 as a facility whose mission was to plan and conduct tests and studies of ammunition and weapons systems. Congress mandated that JPG be closed and its mission be realigned with Yuma Proving Ground in April 1989. As a result, the U.S. Army Environmental Center (USAEC) was given the responsibility for managing and conducting environmental investigations at JPG in conjunction with the BRAC program. Final closure of the facility occurred in September 1995, and the USAEC and USACE began the process of transferring the area south of the firing line to private ownership. Prior to transferring, the Army must ensure that there is no unacceptable risk to human health and the environment for the intended, or restricted, reuse (i.e., industrial/commercial).

For a detailed description of the investigation work performed at JPG and the Baseline Risk Assessment (BIRA), refer to the *Final Phase II Remedial Investigation, Jefferson Proving Ground, Madison Indiana, September 2002*.

The 15 sites (Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30) carried forward to the FS, based on the BIRA and the intended future land use, are briefly summarized within this document. Refer to the *Final Feasibility Study, Jefferson Proving Ground, Madison Indiana, August 2003* for additional information, and to Appendix A for agency review comments and the Army's responses to the FS and this document. Another 38 RI sites have been proposed for No Further Action. The ROD will contain a NFA section summarizing all the NFA sites.

## **Regulatory Chronology**

The Final RI was completed in September 2002. The RI included sampling and analysis to characterize the nature and extent of site contamination, and the BIRA of current and

potential future risks to human health and the environment posed by the contamination for the exposure pathways associated with the future land use. Approximately 53 sites were investigated during the Phase I and Phase II RI. The RI recommended that 38 sites be removed from the RI/FS process because they did not pose an unacceptable risk to human health and the environment exceeding USEPA risk-based criteria, or because they were being addressed under another program (i.e., asbestos abatement and underground storage tank (UST) removal programs). Only 15 sites were brought forward into the FS for remediation alternative evaluation based on levels of contamination that exceeded regulatory risk-based criteria for the residential exposure scenario. Those sites include:

- Site 1 – Building 185 Incinerator
- Sites 2/27 – Sewage Treatment Plant Area
- Sites 3 – Explosive Burning Area, and 4 – Abandoned Landfill
- Sites 7/21B – Red Lead Disposal Area and Temporary Storage Area
- Sites 9/10 – Gate 19 Landfill and Burning Ground South of Gate 19 Landfill
- Site 12A – Building 602 Solvent Pit
- Site 12B – Building 617 Solvent Pit
- Site 12C – Building 279 Solvent Pit
- Site 14 – Yellow Sulfur Disposal Area
- Sites 21A and 30 – Building 204 Temporary Storage Area.

The FS addressed these remaining 15 sites and included the following information:

- Additional risk assessment evaluation based on intended land use for each site.
- Remedial Action Objectives (RAO) for each site based on the risk associated with the contaminants of concern for the intended future land use.
- Development and initial screening of alternative remedial actions.
- Detailed evaluation of the alternatives, including the No Further Action (NFA) alternative as required by statute.

The Final FS was completed and submitted in August 2003. The support agencies' comments on the FS and the Army's responses are included as Appendix A1 to A3.

## **Summary of Site Risks**

A BIRA, conducted as part of the RI, identifies those analytes that are estimated to pose a risk to human health or the environment. These are termed Contaminants of Concern (COCs). The following is a brief overview of the process used in the BIRA to identify COCs and describes how the results of the BIRA were used to develop site-specific RAOs.

Within the BIRA, analytes detected in soils and groundwater were screened against USEPA Region 9 Preliminary Remediation Goals (PRGs) for each site. The soil data were used with air dispersion models to predict concentrations of analytes in air. No air monitoring was done for purposes of the risk assessment as part of the RI. The concentrations of analytes in air were predicted assuming that site soils were not vegetated and that winds would generate dust 252 days per year and that residents would inhale the maximum dust concentrations possible on the property on all of these days. These modeled air concentrations were screened against USEPA Region 9 air PRGs. The USEPA Region 9 PRGs are generic human health-based guidelines that represent concentrations below which risks are so minimal that no further evaluation of risk to humans is considered necessary.

For each site, residential PRGs were used as the initial screening to determine which chemicals would be further evaluated in the risk assessment. The more conservative residential PRGs were used because the future land use of each site was not determined at the time of the assessment. Those chemicals that were above the USEPA Region 9 PRGs are referred to as Chemicals of Potential Concern (COPCs), which means they require further evaluation within the risk assessment to determine if they are COCs.

The risk assessment evaluated the combined effects of the multiple COPCs identified at each site under one or more exposure scenario (e.g., residential, industrial, agricultural, and/or recreational land use). If the potential chemical exposure under the particular land use was estimated to be below the USEPA health risk goals, the site was not considered to pose a human health risk.

The potential for ecological risks associated with chemicals followed a similar process. If the risk goals were met for both human and ecological receptors, then the site was not carried forward to the FS.

In the FS, the risks evaluated in the BIRA for each site were reviewed with respect to the likely future land use and RAOs were developed to focus the development of alternatives on those that would likely achieve target levels for each site.

## **Summary of Alternatives**

This Proposed Plan provides a preferred remedy for each site at JPG. Based on the detailed evaluation of the remedial alternatives in the FS, the Army has determined that the preferred remedial alternatives presented here are the most appropriate. The evaluation criteria that were used are established by CERCLA and are standard for NPL sites. CERCLA specifies nine evaluation criteria to be used when conducting the detailed analysis of remedial alternatives. The first two are threshold criteria that must be met. The next five criteria are balancing criteria, and the remaining two are modifying criteria:

### **Threshold Criteria**

- Overall Protection of Human Health and the Environment addresses whether a remedy provides adequate protection and describes how the alternative achieves the RAOs.
- Compliance with applicable or relevant and appropriate requirements (ARARs) describes whether a remedy will meet all of the ARARs or other Federal and State environmental statutes.

### **Balancing Criteria**

- Long Term Effectiveness and Performance addresses the effectiveness in maintaining protection of human health and the environment after completion of the RA.
- Reduction of Toxicity, Mobility, or Volume through Treatment describes whether the alternative meets the statutory preference for remedies that utilize treatment.
- Short-Term Effectiveness evaluates the impact the alternative may have on the neighboring communities and the immediate environment during implementation.
- Implementability addresses the technical and administrative feasibility of the alternative.
- Cost describes both capital and annual operation and maintenance.

### **Modifying Criteria**

- IDEM Acceptance indicates whether the State concurs with the alternative chosen.
- Community Acceptance will be assessed in the ROD following review of the public comments received after review of this Proposed Plan.

Following is a short description of each site, the remedial alternatives considered for each, and the basis for the selection of the preferred alternative.

### **SITE 1 - BUILDING 185 INCINERATOR**

The Building 185 incinerator is located just west of the Sewage Treatment Plant in the extreme southwestern part of the installation near the intersection of Engineers Road and Tokyo Road (Figure 2). The incinerator is located in an 800-square-ft building and was primarily used to burn debris, small ammunition, and paper products from the installation.

Based on the results of surface soil sampling, presented in the Final RI, all metals except aluminum, arsenic, beryllium, chromium, and manganese at this site are at levels below USEPA Region 9 risk-based criteria. It is likely that the arsenic concentration at this site is a result of naturally occurring variations in soil types rather than a result of releases from the incinerator. The results of the sampling for dioxins/furans indicate that several dioxins/furans are present in the surface soils but are at concentrations similar to those found in background samples. The metals and dioxins were carried into the risk assessment as COPCs.

#### **Summary of Potential Risk – Site 1**

The Risk Assessment was performed for two potential future land uses: Agricultural and Residential.

Under the Agricultural land use, no unacceptable risk exists for this scenario.

Under the future residential scenario, adult and child residents would be at risk from inhalation of dust associated with wind erosion from agricultural fields. The primary COCs are metals (primarily manganese) and dioxins.

However, the dust inhalation pathway was evaluated assuming, very conservatively, that dusts would be generated at the site 252 days per year and that the residents would inhale the maximum dust concentration possible on the property on all these days. The site is currently well vegetated and would not be expected to generate dust due to wind erosion. For this reason, this exposure pathway is unlikely applicable to this site.

In addition, the dioxin concentrations in the soil at Site 1 are at concentrations that are comparable to background concentrations. For this reason, it is not considered practical to carry dioxins forward for further evaluation. Also, the maximum manganese concentration at the site (894 mg/kg) is well below the current USEPA Region 9 full residential PRG (1800 mg/kg).

It should be noted that the primary exposure pathway that resulted in 99% of the risk is due to consumption of beef and milk produced at this site. This activity does not currently occur at this site and will not in the future. The site is intended for industrial use. If the beef and milk scenario had not been factored into the risk scenario, the cancer risk would have met the risk goal.

Results of the Preliminary Ecological Risk Assessment (Rust E&I 1997), utilizing established protocol, determined that silver was the sole COC for ecological receptors. However, it was determined that no further ecological action is warranted because the suspected area of contamination is very small (less than 0.01 acres), only one COC has been identified, and the natural area surrounding the site has been highly disturbed by agricultural activities.

### **Site 1 Conclusion**

Based on this further risk evaluation of the exposure pathways of concern for Site 1, there are no complete exposure pathways that would warrant carrying Site 1 into remediation. Being that the site already meets residential PRGs for the COC defined in the risk assessment (i.e., manganese), and the site is intended for industrial use, there is no practical need for further assessment. Therefore, institutional controls, i.e., deed restrictions, will be implemented to prevent residential use.

The Army, IDEM, and USEPA concur with this conclusion.

### **SITE 2 - SEWAGE TREATMENT PLANT AND SITE 27 - SEWAGE SLUDGE APPLICATION AREA**

This area includes the Sewage Treatment Plant (STP) for JPG, the water quality laboratory associated with the Sewage Treatment Plant, and four former sewage sludge application areas (SSAs). This area (approximately 2.5 acres total) is located in the southwestern corner of JPG. Historically, influent to the plant has included domestic and commercial wastewater, a small quantity of unspecified industrial wastewater, boiler blowdown water, rinses from an on-site photographic lab, and water from the Building 186 oil/water separator. Sludge was previously stockpiled near the treatment plant and was reportedly spread on fields within the installation as a means of disposal. Currently, the majority of the wastewater is domestic sewage from privately leased buildings that are predominately residential, light industrial, and storage. Treated wastewater is discharged to a National Pollution Discharge Elimination System (NPDES) permitted outfall in Harberts Creek.

Based on the RI sample results and field observations, the COCs are found within the sewage sludge application areas. The RI reported that aluminum, arsenic, beryllium, chromium, manganese, silver, and thallium were detected at concentrations exceeding USEPA Region 9 residential criteria. However, background samples of arsenic and

beryllium also exceed USEPA criteria and the concentrations in subsurface soils are consistent with those background levels.

### **Harberts Creek Surface Waters and Sediments**

Elevated arsenic concentrations were detected in sediment samples from Harberts Creek. Concentrations similar in magnitude were previously noted in stream sediments and were determined to be consistent with elevated background levels identified for the entire JPG area. Sediment also contained aluminum, beryllium, chromium, iron, manganese, and vanadium at concentrations above USEPA Region 9 criteria.

Although the outfall to Harberts Creek is monitored to satisfy NPDES permit requirements, bypass releases have occurred in the past and may have resulted in the release of contaminants to surface water and sediments. It is suspected that the spent chemicals from the water quality laboratory were previously processed through the sewage treatment plant. This may have resulted in contamination of surface water and sediments in Harberts Creek if removal of the contaminants through the primary and secondary treatment processes was incomplete. There have also been reports in the past that during high flow, or heavy rain events, untreated wastewater bypassed the treatment system and was discharged directly into Harberts Creek.

### **Summary of Potential Risk - Sites 2/27**

The risk assessment was performed for three potential future land uses: Agricultural, Residential, and Industrial. However, Sites 2/27 will be used as industrial; therefore that summary is presented below.

Under the future industrial land use scenario, there is some health hazard associated with inhalation of fugitive dusts and the COCs are aluminum, manganese, and silver.

However, the predicted dust concentrations are likely orders of magnitude more conservative than they should be, because it was assumed, very conservatively, that the entire site would be unvegetated and dusts would be generated at the site 252 days per year. The site is currently well vegetated and covered with structures and would not be expected to generate dust due to wind erosion. For this reason, this exposure pathway is unlikely applicable to this site.

In addition, the maximum concentrations of the COCs at the site are below the current USEPA Region 9 full PRGs.

There is no ecological risk associated with this site. Based on the collection of macroinvertebrate samples, fish community sampling, water quality measurements, and a habitat assessment of Site 2 as compared to an unimpacted, upstream reference area location, the aquatic life within Harberts Creek near Site 2 does not appear to be



significantly different than that occurring at the upstream reference area. Site 2 had similar macroinvertebrate and fish communities as that of the reference area; the water quality measurements were similar; and the habitat rating for Site 2 was similar to or better than the habitat rating for the reference area. As a result of this assessment, the aquatic habitat at Site 2 does not appear to be negatively impacted by former site activities.

**Sediment COCs for Harberts Creek.** Residents who may potentially hunt in the area of Sites 2/27 and may wade in Harberts Creek were evaluated under a hunter scenario in the risk assessment contained in the RI. Based on the results of the risk assessment, exposure of hunters to analytes in Harberts Creek surface water and sediment would not pose a human health concern.

### **Sites 2/27 Conclusion**

Based on the evaluation of potential risks at Sites 2/27, there is no human health risk or concern for these sites under the future industrial land use scenario that would warrant remediation. Therefore, deed restrictions will be placed on the property to prohibit other land uses.

The Army, IDEM, and USEPA concur with this conclusion.

## **SITE 3 – EXPLOSIVE BURNING AREA AND SITE 4 – ABANDONED LANDFILL AND NEW BURN SITE**

Sites 3/4 are contained in an approximately 3-acre open field south of Engineers Road and East of Papermill Road. This area contains the Abandoned Landfill (Site 4), which occupies about 1 acre of the eastern side of the field. The Explosive Burning Area (Site 3) consists of the remaining open area. A third area, the New Burn Site, consisting of a narrow trench approximately 5 ft deep, is located to the west of Sites 3/4.

Site 3, the Explosive Burn Area, consists of surface soil contamination that contains aluminum, manganese, and thallium in concentrations exceeding USEPA Region 9 PRGs.

The second area, the landfill trench, contains soils contaminated with metals, semi-volatile organic compounds (SVOCs), and one volatile organic compound (VOC) (trichloroethene). Aluminum, arsenic, barium, beryllium, cadmium, chromium, copper, and lead were found to exceed USEPA Region 9 PRGs and were retained as COPCs in soils.

The third area, the New Burn Site, contains soil contaminated with lead, dioxins/furans, several PAH-related SVOCs, and the pesticide DDE.

Groundwater downgradient of Sites 3/4 was found to contain several metals exceeding their respective background concentrations and minor organic contamination. Of these

contaminants, aluminum, antimony, arsenic, cobalt, iron, lead, manganese, molybdenum, and 4-amino-2,6-dinitrotoluene were retained as COPCs for groundwater. Groundwater downgradient of the landfill trench migrating along the till/bedrock interface contained several VOCs, including trichloroethene that exceeded its PRG.

### **Summary of Potential Risk - Sites 3/4**

The risk assessment was performed for two potential future land uses: Agricultural and Residential. The sites are intended for agricultural use, however it is possible that there may be some residential use, therefore both of these are summarized below.

For each scenario, a critical groundwater pathway was identified for ingestion by a child. The COCs in groundwater are arsenic and chromium (VI). However, arsenic concentrations in groundwater are below the maximum contaminant level (MCL) of 10 ug/L, and total chromium in groundwater is above the chromium (VI) PRG (110 ug/L) at only one location (MW95-06) with a concentration of 208 ug/L. Therefore, arsenic will not be addressed, and chromium (VI) will be addressed by species-specific monitoring to determine its actual presence. If it is determined through monitoring that chromium (VI) is background or naturally occurring, further monitoring will be unnecessary and cease. If chromium (VI) is found not to be background or naturally occurring, then groundwater containing elevated concentrations of chromium (VI) will be addressed to mitigate risk.

For the agricultural land use scenario, there is no human health concern posed at any of the areas of Site 3, 4, and the New Burn Site.

**Site 3/4 (excluding Site 4 Trench).** For the residential land use scenario, ingestion of groundwater is the critical exposure pathways for receptors as indicated above.

**Site 4 – Trench Area Only.** For the residential land use scenario, ingestion of groundwater is the critical exposure pathway for receptors. Incidental ingestion of soil and ingestion of fruits/vegetables are also critical pathways for the child receptor. Barium and cadmium are noncarcinogenic COCs in soil. Trichloroethylene is an additional COC in groundwater for the child receptor. In addition, lead in soil would pose a potential health concern to children.

**New Burn Site (including Burn Area).** For the residential scenario, incidental ingestion of soil, ingestion of homegrown fruits and vegetables, and ingestion of groundwater are critical exposure pathways for one or more receptors at this site. Benzo(a)pyrene is the primary carcinogenic COC in soil (burn area only) due to incidental soil ingestion. Zinc is the primary noncarcinogenic COC and PAHs and 2,3,7,8- TCDD are the primary carcinogenic COCs in fruits and vegetables (burn area only).

**Ecological Effects.** Based on the ecological effects data, there are few adverse ecological effects at Sites 3/4.

## **Remedial Action Objectives – Sites 3/4**

Although the current intended use for this area is agricultural and there are no health risks associated with agricultural land use, soils and groundwater will be remediated so that the site can be used as residential. To meet residential PRGs, soils in the Trench and the New Burn Area need to be remediated as well as groundwater at the sites. The site-specific RAOs for soils and groundwater under residential land use are as follows:

### **Site 3/4 (Excluding Site 4 Trench)**

- There is no unacceptable risk associated with soils for residential use of this area.
- Prevent exposure to contaminated groundwater to reduce noncancer risk below a hazard index (HI) of 1. If it is determined through monitoring that chromium (VI) is background or naturally occurring, further monitoring will be unnecessary and cease. If chromium (VI) is found not to be background or naturally occurring, then groundwater containing elevated concentrations of chromium (VI) will be addressed to mitigate risk. Chromium (VI) does not have a listed MCL. However, chromium (VI) will be compared to the MCL of total chromium (100 ug/L) which is more stringent than the 2002 tap water PRGs for chromium (III) (55,000 ug/L) and chromium (VI) (110 ug/L). Contaminant MCLs were taken from the USEPA's July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.

### **Site 4 – Trench Area**

- Remediate contaminated soils to reduce noncancer risk below acceptable levels (i.e., USEPA Region 9 PRGs). This would be accomplished by remediation of soils containing elevated concentrations of lead, barium, and cadmium to levels that are below USEPA 2002 Region 9 residential soil PRGs or background concentrations, whichever is higher. Region 9 residential soil PRGs for these are as follows: lead 400 mg/kg; barium 5,400 mg/kg; and cadmium 3.7 mg/kg. Confirmation testing will be performed for metals, including antimony.
- Prevent exposure to contaminated groundwater to reduce noncancer risk to acceptable levels. This would be accomplished by mitigating exposure to groundwater containing concentrations of trichloroethylene above the MCL of 5 ug/L.

### **New Burn Site (Including Burn Area)**

- Remediate contaminated soils to reduce cancer and noncancer risk below acceptable levels. This would be accomplished by remediation of soils containing

elevated concentrations of benzo(a)pyrene, to levels that are below USEPA 2002 Region 9 residential soil PRGs, and 2,3,7,8 –TCDD and zinc in the Burn Area to levels below USEPA residential PRGs, or background concentrations, whichever is higher. Region 9 PRGs are: 0.06 mg/kg-benzo(a)pyrene;  $3.9 \times 10^{-6}$  mg/kg - 2,3,7,8 TCDD; and 23,000 mg/kg zinc. Confirmation sampling will be performed for benzo(a)pyrene, 2,3,7,8, TCDD, and metals, including antimony.

- Prevent exposure to contaminated groundwater to reduce noncancer risk to acceptable levels. If it is determined through monitoring that chromium (VI) is background or naturally occurring, further monitoring will be unnecessary and cease. If chromium (VI) is found not to be background or naturally occurring, then groundwater containing elevated concentrations of chromium (VI) will be addressed to mitigate risk. Chromium (VI) does not have a listed MCL. However, chromium (VI) can be compared to the MCL of total chromium (100 ug/L) which is more stringent than the 2002 tapwater PRGs for chromium (III) (55,000 ug/L) and chromium (VI) (110 ug/L). Contaminant MCLs were taken from the USEPA's July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.

#### **Alternatives for Soils - the Trench Area and the New Burn Site**

After review of the applicable general response actions and process options for soils in the FS, the following three RA alternatives were retained for further development:

Alternative 1	No-Action
Alternative 2	Limited Action (Institutional Controls)
Alternative 3	Excavation and Disposal

**Soils Alternative 1: No-Action.** Under this alternative, the Army would take no action and the contaminated soils would remain in place. This alternative would not eliminate or reduce the exposure to the contaminants of concern. Human health RAOs would not be met and the existing risk to humans and the environment would remain.

**Soils Alternative 2: Limited Action (Institutional Controls) for Sites 3/4.** This alternative includes deed restrictions limiting the use of the sites for residential use. In addition, fencing is included to prevent contact with soils. By placing permanent restrictions on land use, this alternative would protect future residents from health risks due to ingestion or contact with soils. This alternative would likely comply with applicable action-and location-specific ARARs and would be protective of human health and the environment.

**Soils Alternative 3: Excavation and Disposal for Soils at Sites 3/4.** This alternative assumes excavation of the Trench soils and the soils at the New Burn Site with confirmation testing to assure residential PRGs are met. The soils would be transported

for disposal at a licensed landfill following characterization testing. This alternative meets human health and environmental RAOs for possible future residents, thus would be protective of human health and the environment over the long term for unrestricted use. There would be no reduction in toxicity or volume with this alternative, however mobility would be reduced by disposal in a properly constructed licensed landfill.

### **Alternatives for Groundwater - Sites 3/4**

Regardless of the RA selected for Sites 3/4, two monitoring wells will be installed as sentry groundwater monitoring locations between monitoring well MW01-03 and Harberts Creek. Both of these monitoring wells will be screened at the bedrock/till interface and be monitored for VOCs. The two wells will be incorporated into the remedy selected below and assigned a role in potential future groundwater monitoring at the sites.

Alternative 1     No-Action

Alternative 2     Limited Action (Institutional Controls and Monitoring)

Groundwater remediation alternatives presume that contaminated soil removal as described in Soil Alternative 3 would be implemented. Besides addressing the potential risks that the soil poses to human health and the environment through direct contact or incidental ingestion or inhalation, the removal of these soils will also eliminate a potential continuing source of contaminants to groundwater.

In addition, the groundwater remediation alternatives assumes that the results of testing for chromium (VI) will be negative.

**Groundwater Alternative 1: No-Action.** For the No-Action alternative, the contaminated groundwater remains and drinking water MCLs are not met. This alternative would not be protective of human health and the environment.

**Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring).** This Limited Action alternative does not involve active remediation; groundwater would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by placing restrictions preventing the usage of water from existing or future wells. Groundwater monitoring would be performed to assess the progress of intrinsic biodegradation of VOCs in groundwater. Additional monitoring may be added for chromium, if necessary. The long-term monitoring program will be identified in the RA workplans and will have concurrence of the regulatory agencies. By placing permanent restrictions on water usage through well permitting regulations and by land use deed restrictions, this alternative would protect future residents from health risks due to ingestion or contact with on-site well water regardless of disposition of soil contamination.

## **Evaluation of Alternatives for Sites 3/4**

Table 1 provides a comparative analysis of Alternatives 1 through 3 for soils at Sites 3/4 and Table 2 provides a comparative analysis of Alternatives 1 and 2 for groundwater. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in the Tables, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Sites 3/4 and New Burn Area. Alternative 3 – Excavation and Disposal is the recommended RA for contaminated soils. This Soils RA would allow free access to the property and would have no long-term presence requirement associated with soils.

The Army, IDEM, and USEPA concur that these are the preferred alternatives for Sites 3/4.

### **SITE 7 - RED LEAD DISPOSAL AREA AND SITE 21B - TEMPORARY STORAGE AREA AT BUILDING 211**

Building 211 is located along Woodfill Road just west of the intersection with Meridian Road. It had been previously used for the loading of inert ordnance. Both the red lead disposal area (Site 7) and the temporary storage area (Site 21B) are located south of Building 211 near the west end of the building. The area (including the building) is less than 1 acre. At the time of the RI, there was red staining in the area between the building and the railroad tracks and also in one place on the gravel between the railroad tracks.

The area around Building 211 is generally flat except where there is a shallow narrow ditch between the railroad tracks and Building 211. Surface water collects in this ditch and probably infiltrates into the soil. It is possible that if enough runoff enters the ditch, the water might run west and enter the storm water drains. The drains in this part of the installation eventually discharge into Harberts Creek.

An interim removal was performed in 1996 to excavate contaminated soil. This was verified by confirmation samples within the excavated area.

Groundwater results for metals indicated that arsenic is the primary contaminant in Site 7 wells and exceeds the USEPA Region 9 criteria. The source of the elevated arsenic levels is unknown since arsenic was at background levels in the soils at Site 7. Well MW93-10, located upgradient of Site 7, also contained elevated arsenic indicating that the contamination may be naturally occurring. Barium concentrations also exceeded USEPA Region 9 criteria. The source of the barium is likely the barium sulfate reportedly disposed of at the site.

Soils immediately surrounding Site 21B were removed during the interim removal action. Confirmation sampling indicated that residual contamination may still exist at one sample location where the metals aluminum, barium, beryllium, and manganese exceeded their USEPA Region 9 residential PRG.

The results for three wipe samples collected indoors indicate that a number of unknown SVOCs are present where samples were collected from surfaces coated with oily residues. The metals detected in the wipe samples are boron, barium, copper, manganese, lead, and zinc. The detection of bis(2-ethylhexyl)phthalate, a common plasticizer, may be related to either the use of a plastic template for the wipe sampling or to laboratory-introduced contamination.

Groundwater contamination is somewhat uncertain. Arsenic groundwater concentrations exceed USEPA Region 9 criteria despite all soil arsenic values for this area being less than soil background levels. Barium, the other metal that exceeded USEPA Region 9 criteria, has been eliminated from the soil by the interim remedial action, and groundwater concentrations are expected to decline with time, unless monitoring results determine that arsenic is naturally occurring.

### **Summary of Potential Risk - Sites 7/21B**

Based on the results of the human health risk assessment, the primary exposure pathway(s) and COCs that pose potential human health concern are described by land use scenario. The intended land use is industrial. The critical exposure pathway for future on-site worker is ingestion of groundwater, and arsenic is the only COC. Based on the confirmation testing performed after excavation of contaminated soils, soils do not pose a health risk.

Ecological risks at Sites 7/21B have been minimized by the interim removal action. Sites 7/21B are intended for industrial use. The ecological risk assessment was performed under the assumption that the site would be managed as ecological habitat, which is not the case. HIs and hazard quotients (HQs) based on the interim measures confirmation sampling data are within the same order of magnitude, or lower than, those observed at the reference areas.

### **Remedial Action Objectives - Sites 7/21B**

The RA objective for the industrial land use scenario includes:

- Prevent exposure to groundwater to reduce noncancer and cancer risks to acceptable levels. If it is determined through monitoring that arsenic is background or naturally occurring, further monitoring will be unnecessary and cease. If arsenic is found not to be background or naturally occurring, then groundwater containing elevated concentrations of arsenic will be addressed to mitigate risk. This would be accomplished by mitigating exposure to

groundwater containing concentrations of arsenic that are above the MCL of 10 ug/L. Contaminant MCLs were taken from the USEPA's July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.

- No remedial action is required for soil.

### **Alternatives for Groundwater – Sites 7/21B**

Because the groundwater contamination poses no current threat to human health and the elevated arsenic may be naturally occurring, the alternatives developed include:

Alternative 1 – No-Action

Alternative 2 – Limited Action (Institutional Controls and Monitoring)

Alternative 3 – Collection and Treatment

**Groundwater Alternative 1: No-Action.** This alternative does not involve active remediation, i.e., site water would be left in place. This alternative meets the RAO under current conditions. However, it would not meet the objectives for future exposure scenarios. Drinking water MCLs would not likely be met by this alternative.

#### **Groundwater Alternative 2: Limited Action (Institutional Controls with Monitoring)**

This alternative does not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. This alternative would include land use restrictions to prevent future usage of the contaminated groundwater. Groundwater monitoring would include periodic groundwater sampling to evaluate groundwater chemistry and natural dilution and dispersion. This alternative would meet the RAO under current and future conditions by restricting usage of the groundwater. Drinking water MCLs are not likely to be met by this alternative, although exposure is limited. However, a waiver of the ARARs may be necessary should the occurrence of arsenic be determined through monitoring to be naturally occurring and not technically feasible to remediate.

**Alternative 3: Collection and Treatment.** This alternative would involve collecting the contaminated water and on-site treatment to remove metals. A pumping system would collect the water to reduce arsenic concentrations and control groundwater flow, followed by a relatively simple chemical precipitation treatment, after which the clean water would be disposed of to the existing surface water system and the collected metals disposed of in a regulated landfill. Because arsenic would be removed from the groundwater, this alternative will likely meet the RAOs. Arsenic concentrations may be reduced to MCLs. However, a waiver of the ARARs may be necessary should the occurrence of arsenic be determined through monitoring to be naturally occurring and not technically feasible to remediate.



## **Evaluation of Alternatives for Sites 7/21B**

Table 3 provides the results of the comparative analysis of Alternatives 1, 2, and 3 for Sites 7/21B groundwater. Relative ranking of the three alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. Alternative 2 - Limited Action earns the highest relative ranking. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in Table 3, Alternative 2-Limited Action (Institutional Controls with Monitoring), is the recommended RA for the contaminated groundwater at Sites 7/21B.

Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Osgood Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of arsenic in groundwater. Monitoring of groundwater will provide information about the nature and occurrence of the arsenic in groundwater.

The Army, IDEM, and USEPA concur that this is the preferred alternative for Sites 7/21B.

## **SITE 9 - BURNING GROUND AT GATE 19 LANDFILL AND SITE 10 - GATE 19 LANDFILL**

The Gate 19 Landfill and the associated former burning ground are located at the far west end of the Firing Line north of the intersection of Firing Line Road and West Perimeter Road. The Gate 19 Landfill is a 12-acre landfill that includes an asbestos-disposal area and a waste pile of construction debris. The landfill was closed in 1995 with placement of a synthetic membrane and clean soil cover.

The Burning Ground, a ½-acre area used for the open burning of construction debris and waste propellants, was reportedly located in the southern part of the Gate 19 Landfill. The burning area, which was used between the 1950s and 1970s, reportedly also received trichloroethene and paint waste. The area lies just south of the landfill and is currently overgrown with vegetation, making the burning area not readily discernable.

Human activities at the site are currently limited to occasional access by investigation and maintenance personnel because the site is located north of the Firing Line.

The area is flat to gently rolling, and most surface-water runoff appears to flow toward a small pond at the southwestern corner of the area. This pond also receives runoff from a ditch that flows west along Firing Line Road from as far away as Building 602. Installation personnel reported that the pond is an abandoned rock quarry that predates JPG. The pond discharges to the west via a small drainage swale, and the water runs

through open farmland until it enters Middle Fork Creek about a quarter of a mile west of the installation boundary.

Surface soils contain metals contamination and subsurface soils, at both the landfill and the Burning Ground, contain metals at concentrations exceeding USEPA Region 9 criteria. Subsurface soils at the Burning Ground contain PAHs as well. Sediments at the landfill pond contain aluminum, beryllium, and manganese and pond surface water contains manganese and 1,3,5-trinitrobenzene at concentrations exceeding USEPA Region 9 criteria.

Middle Fork Creek sediment sampling indicated iron at levels exceeding USEPA Region 9 criteria, however water sampling indicated no exceedances.

Groundwater contained metals (arsenic, beryllium, cobalt, lead, and manganese) at concentrations exceeding USEPA Region 9 criteria.

### **Summary of Potential Risk - Sites 9/10**

Based on the results of the human health risk assessment, the primary exposure pathway(s) and COCs that pose a potential health concern are described for the refuge land use scenario.

A site-wide evaluation was performed for risk to on-site hunters, and trespassers who may have contact with Sites 9/10 a portion of the time. The hunter and trespasser scenario would most closely characterize human exposure to these sites under a refuge/recreational land use scenario. Based on the risk assessment, neither hunter or trespasser exposure to the site would pose a human health risk.

Based on the ecological risk assessment, the terrestrial ecosystem did not appear to be adversely effected. It could not be conclusively determined if there was an aquatic ecosystem concern at the pond, because no evaluation of background data was performed as part of the ecological risk assessment for aquatic receptors. The driving concern in the pond was vanadium sediment concentrations. The vanadium was estimated to pose a potential concern if great blue herons use the pond as a feeding area. The primary route of exposure that was a concern was ingestion of sediment while feeding. Bioaccumulation of vanadium in the prey was not estimated to be a concern. In review of the Middlefork Creek sediment data, the maximum concentration of vanadium in the pond was less than the maximum upstream (or background) concentration of vanadium in Middlefork Creek. For this reason, the vanadium concentrations and potential risks in the pond appear to be comparable to background levels. For this reason, further evaluation of the pond environment was not considered necessary for purposes of the FS.

### **Sites 9/10 Conclusion**

Sites 9 and 10 are located north of the firing line, and will not be transferred out of Army ownership. The planned future land use for these two sites, is incorporation into the current refuge system. Based on this intended land use, there are no exposure pathways that would pose a human health or ecological concern.

Sites 9 and 10 are recommended for NFA, Restricted Use. Fencing currently restricts the site and the areas will not be transferred for public use.

The Army, IDEM, and USEPA concur with this conclusion.

### **SITE 12A - BUILDING 602 SOLVENT PIT**

Building 602 is located just north of Woodfill Road about one-third of a mile west of Tokyo Road. Building 602, a former ammunition-assembly plant, was being used as an employee break area and a boiler plant at the time of the Phase I RI. Since facility closure in 1995, the building is no longer in use.

Building 602 was previously the site of a 25,000-gallon leaking UST that was removed in 1988. The associated contaminated soils were also excavated.

The solvent disposal pit (3-ft diameter, 3 ft deep), located immediately adjacent to Building 602 resulted in VOC contamination of the surrounding soils. A removal action was performed in 2000 to remove the VOC-contaminated soils in the vicinity of the solvent pit. Confirmation sampling, performed to assess the removal action, indicated that soils exceeded PRGs along the foundation wall. An additional 4-ft depth was excavated along the foundation wall. Some soil parameters at the foundation wall (at this 12-ft depth) exceeded PRGs. However, additional excavation was not performed due to the proximity of building structures and the potential for undermining those structures.

Groundwater VOC contamination appears to have migrated vertically downward from the former solvent pit through vertical fractures in the glacial till. The lateral extent of VOC contamination is limited in the glacial till based on the lack of detection of significant concentrations in the boreholes or probeholes surrounding the solvent pit. These results indicate that VOC concentrations in the glacial till reduce rapidly with lateral distance from the pit, indicating that the solvents infiltrated downward to the groundwater before migrating laterally. Lateral migration of the VOC contamination occurred at the bedrock/till interface where greater horizontal permeability was encountered. Based on analytical data, the VOC plume has migrated generally to the southeast and appears to be stable at a downgradient distance of 270 feet from the former solvent pit. The VOC plume is characterized by concentrations of 1,1,1-TCA that range from 1.4 to 94,000 µg/L. The

observed extent of contamination supports the conclusion that groundwater is generally moving to the southeast.

Site 12A was assessed as a candidate for natural attenuation using the USEPA screening criteria contained within the BIOCHLOR model (USEPA, 2000). Based on this assessment, Site 12A is a strong candidate site for natural attenuation by reductive dechlorination.

### **Summary of Potential Risk - Site 12A**

Based on the results of the human health risk assessment, the primary exposure pathway(s) and COCs that pose potential human health concern for the industrial land use scenario is ingestion of groundwater. This assumes that a shallow drinking water well is placed at the site for drinking water purposes. The compound responsible for most of the hazard is 1,1,1-trichloroethane.

Based on protocols established in the preliminary ecological risk assessment (PERA) (Rust E&I 1997b), there were no potential ecological risks determined for Site 12A.

### **Remedial Action Objectives - Site 12A**

The RA objective for the industrial land use scenario includes:

- Prevent exposure to groundwater to reduce noncancer risk to acceptable levels. This could be accomplished by mitigating exposure to groundwater containing concentrations of 1,1,1-trichloroethane that are above the MCL of 200 ug/L. Contaminant MCLs were taken from the USEPA's July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.
- No RA is required for soil.

### **Alternatives for Groundwater - Site 12A**

After review of the applicable response actions and process options, the following three RA alternatives were formulated for groundwater remediation:

- |               |                                                         |
|---------------|---------------------------------------------------------|
| Alternative 1 | No-Action                                               |
| Alternative 2 | Limited Action (Institutional Controls with Monitoring) |
| Alternative 3 | Collection and Treatment                                |

Two monitoring wells will be installed and screened across the till/loess interface. The wells will be monitored for VOCs to evaluate the effect of the solvent pit removal on groundwater. The new wells will be incorporated into the preferred remedy.

**Groundwater Alternative 1: No-Action.** Under this alternative, site water would remain without change except through potential natural attenuation. This alternative does not meet the RAOs for possible future residents. Drinking water MCLs are not met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time.

**Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring).** This alternative does not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collection of the hydrocarbon-water mixture utilizing wells and pumping systems. The mixture would be processed in an on-site treatment system and disposed of into the existing surface water system following treatment. Because VOC contamination is removed from the groundwater, this alternative meets the RAOs. VOC concentrations would be reduced to below the ARARs. By treating the collected water, human health remediation goals may be met for future receptors. The property could be released without restriction.

### **Evaluation of Alternatives for Site 12A**

Table 4 provides a comparative analysis of Alternatives 1 through 3 for Site 12A groundwater. Relative rankings of the three remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. Alternative 2 – Limited Action (Institutional Controls and Monitoring) earns the highest relative ranking. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in Table 4, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12A.

Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of VOCs in groundwater. Monitoring of groundwater will provide information to evaluate intrinsic biodegradation and the potential for plume movement.

The Army, IDEM, and USEPA concur with this alternative.

## **SITE 12B - BUILDING 617 SOLVENT PIT**

Building 617 is located north of Woodfill Road about one-third of a mile east of Tokyo Road. Building 617 was an ammunition-assembly plant in the past. The solvent disposal pit (3-ft diameter, 3 ft deep), located immediately adjacent to the building, resulted in VOC contamination of the surrounding soils.

Three steel USTs, used to store fuel oil, were formerly located south of Building 617. The tanks and associated contaminated soil have since been removed.

A removal action was performed in 2000 to remove the VOC-contaminated soils in the vicinity of the solvent pit. Confirmation sampling was performed to assess the removal action. Excavation was performed to a depth of 8 ft and confirmation sampling indicated that soils along the foundation wall exceeded PRGs. Excavation continued an additional 4 ft along the foundation wall. Some soil parameter exceeded PRGs. However, additional excavation was not performed due to the proximity of building structures and the potential of undermining those structures.

Groundwater VOC contamination appears to have migrated vertically downward from the former solvent pit through vertical fractures in the glacial till. The lateral extent of VOC contamination is limited in the glacial till based on the lack of detection of significant concentrations in the boreholes or probeholes surrounding the solvent pit. These results indicate that VOC concentrations in the glacial till reduce rapidly with lateral distance from the pit, indicating that the solvents infiltrated downward to the groundwater before migrating laterally. Lateral migration of the VOC contamination occurred at the bedrock/till interface where greater horizontal permeability was encountered. Based on the analytical data, the VOC plume has migrated generally to the southwest and appears to be stable at a downgradient distance of 600 ft from the former solvent pit. The VOC plume is characterized by concentrations of 1,1,1-TCA that range from 58 to 18,000 µg/L. The observed extent of contamination supports the conclusion that groundwater is generally moving to the southwest.

In addition, the results from the groundwater samples collected in the deep bedrock wells indicates that elevated concentrations of VOCs are also present in the dolomite bedrock from the bedrock/till interface to the dolomite/shale interface. The shale is an aquitard that limits further vertical migration below the dolomite. This VOC plume in the dolomite extends southwest from the former solvent pit for an approximate distance of 350 ft. The lateral extent of this plume is defined by four other deep bedrock monitoring wells, located around the former source area, that did not have VOCs detected.

Site 12B was assessed as a candidate for natural attenuation using the USEPA screening criteria contained within the BIOCHLOR model (USEPA, 2000). Based on this assessment, Site 12B is an adequate candidate site for natural attenuation by reductive dechlorination.

## **Summary of Potential Risk - Site 12B**

Based on the results of the human health risk assessment, the primary exposure pathway(s) and COCs that pose potential human health concern are described below for the industrial land use scenario.

The critical exposure pathway is ingestion of groundwater under the assumption that a shallow drinking water well is placed at the site for drinking water purposes. The COCs for this scenario are 1,1-dichloroethylene, 1,1,1-trichloroethane, and 1,2-dichloroethane.

Based on protocols established in the PERA (Rust E&I 1997b), there were no potential ecological risks determined for Site 12B.

## **Remedial Action Objectives – Site 12B**

The RA objective for the industrial land use scenario includes:

- Prevent exposure to groundwater to reduce noncancer risk to acceptable levels. This could be accomplished by mitigating exposure to groundwater containing concentrations of 1,1-dichloroethylene, 1,1,1-trichloroethane and 1,2-dichloroethane that are above their MCLs. The listed USEPA MCLs for the above compounds are as follows: 1,1-dichloroethylene 7 ug/L; 1,1,1-trichloroethane 200 ug/L; and 1,2-dichloroethane 5 ug/L. Contaminated MCLs were taken from the USEPA's July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.
- No RA is required for soil.

## **Alternatives for Groundwater – Site 12B**

After review of the applicable response actions and process options, the following three RA alternatives were formulated for groundwater remediation:

- |               |                                                        |
|---------------|--------------------------------------------------------|
| Alternative 1 | No-Action                                              |
| Alternative 2 | Limited Action Institutional Controls with Monitoring) |
| Alternative 3 | Collection and Treatment                               |

Three monitoring wells will be installed and screened across the till/loess interface downgradient of the former solvent pit. The new wells will be monitored for VOCs to evaluate the effect of the solvent pit removal on groundwater. One additional well will be installed at the till/bedrock interface to fill a potential data gap in the monitoring array. The new wells will be incorporated in to the remedy selected for the site.

**Groundwater Alternative 1: No-Action.** Under this alternative, site water would remain without change except through possible natural attenuation. This alternative does not meet the RAOs for possible future residents. Drinking water MCLs are not met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time.

**Groundwater Alternative 2: Limited Action (Institutional Controls with Monitoring).** This alternative does not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property is released to the public. This option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collection of the hydrocarbon-water mixture utilizing wells and pumping systems. The mixture would be processed in an on-site treatment system and disposed of into the existing surface water system following treatment. Because VOC contamination is removed from the groundwater, this alternative meets the RAOs. VOC concentrations would be reduced to below the ARARs. By treating the collected water, human health remediation goals may be met for future receptors. The property could be released without restriction.

### **Evaluation of Alternatives for Site 12B**

Table 5 provides a comparative analysis of Alternatives 1 through 3 for Site 12B groundwater. Relative rankings of the three remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. Alternative 2 - Limited Action (Institutional Controls and Monitoring) earns the highest relative ranking. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in Table 5, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12B.

Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of VOCs in groundwater. Monitoring of groundwater will provide information to evaluate intrinsic biodegradation and the potential for plume movement.

The Army, IDEM, and USEPA concur with this alternative.



## **SITE 12C - BUILDING 279 SOLVENT PIT**

Building 279, a former ammunition-assembly plant, is located 1 block north of Woodfill Road and 2 blocks west of Meridian Road along the Firing Line. The building is no longer used except for equipment storage. The site is located north of the firing line and therefore will not be the subject of a property transfer.

The solvent disposal pit (3-ft diameter, 3 ft deep), located immediately adjacent to Building 279, resulted in VOC contamination of the surrounding soils.

A removal action was performed in 2000 to remove the VOC-contaminated soils in the vicinity of the solvent pit. Confirmation sampling was performed to assess the removal action. Results indicated no PRG exceedances.

Solvent contamination is limited in the glacial till to the immediate vicinity of the former solvent pit. No bedrock groundwater VOC contamination was detected at this site. Also, the probehole data indicate that solvent-contaminated groundwater in the glacial till is mostly restricted to the immediate area near the solvent pit. Because the bedrock groundwater beneath the former solvent pit does not appear to be contaminated, vertical migration is limited.

Site 12C was assessed as a candidate for natural attenuation using the USEPA screening criteria contained within the BIOCHLOR model (USEPA, 2000). Based on this assessment, Site 12C is a strong candidate site for natural attenuation by reductive dechlorination.

### **Summary of Potential Risk - Site 12C**

Because soil remediation has already been performed at Site 12C, soils are no longer a human health risk.

Based on the results of the human health risk assessment the primary exposure pathway(s) and COCs that pose potential human health concern are described below for the industrial land use scenario.

The critical exposure pathway is ingestion of groundwater by workers under the assumption that a shallow drinking water well is placed at the site for drinking water purposes. The COCs for this scenario are the same as for the residential exposure scenario (i.e., 1,1,1-trichloroethane, 1,1-dichloroethylene, and trichloroethene).

Based on protocols established in the PERA (Rust E&I 1997b), there were no potential ecological risks determined for Site 12C.

## Remedial Action Objectives - Site 12C

The RA objective for the industrial land use scenario includes:

- Prevent exposure to groundwater to reduce noncancer risk to acceptable levels. This could be accomplished by mitigating exposure to groundwater containing concentrations of 1,1,1-trichloroethane, 1,1-dichloroethylene, and trichloroethene that are above their MCLs. The listed USEPA MCLs for the above compounds are as follows: 1,1,1-trichloroethane 200 ug/L; 1,1-dichloroethylene 7 ug/L; and trichloroethene 5 ug/L. Contaminated MCLs were taken from the USEPA's July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.
- No RA is required for soil.

## Alternatives for Groundwater – Site 12C

After review of the applicable response actions and process options, the following three RA alternatives were formulated for groundwater remediation:

Alternative 1	No-Action
Alternative 2	Limited Action (Institutional Controls with monitoring)
Alternative 3	Collection and Treatment

**Groundwater Alternative 1: No-Action.** Site water would remain without change except through possible natural attenuation. This alternative does not meet the RAOs for possible future residents. Drinking water MCLs are not met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time. This alternative would not likely be protective of human health and the environment over the long term.

**Groundwater Alternative 2: Limited Action (Institutional Controls with Monitoring).** This alternative does not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property is released to the public. This option would not limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collection of the hydrocarbon-water mixture utilizing wells and pumping systems. The mixture would be processed in an on-site treatment system and disposed of into the existing surface water system following treatment. Because VOC contamination is removed from the

groundwater, this alternative meets the RAOs. By treating the collected water, human health remediation goals may be met for future receptors. The property could be released without restriction. This alternative would reduce the contaminant toxicity, mobility, and volume from the sites utilizing a treatment process.

### **Evaluation of Alternatives for Site 12C**

Table 6 provides a comparative analysis of Alternatives 1 through 3 for Site 12C groundwater. Relative rankings of the three remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. Based on the comparative analyses shown in the table, Alternative 2 - Limited Action (Institutional Controls with Monitoring) earns the highest relative ranking. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in Table 6, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12C.

Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of VOCs in groundwater. Monitoring of groundwater will provide information to evaluate intrinsic biodegradation and the potential for plume movement. It is likely that intrinsic biodegradation will occur within the monitoring period. Therefore, when monitoring shows that MCLs are met, monitoring will be discontinued and deed restrictions will be lifted.

The Army, IDEM, and USEPA concur with this alternative.

### **SITE 14 - YELLOW SULFUR DISPOSAL AREA**

The yellow sulfur disposal area is located just west of the intersection of Papermill Road and Infantry Road. In addition to sulfur, other debris such as melted glass was present. The source of these materials was not determined. Sulfur was observed extending for about 50 ft from a gravel road down to an intermittent drainage swale.

An interim removal action was conducted in the area containing the yellow sulfur (approximately an area of 3,750 sf). As excavation activities progressed, unexploded ordnance (UXO) was encountered and the excavation activities were halted. The stockpiled soils were transported to an area north of the firing line for temporary storage in a bermed and plastic-lined containment area to allow screening of the soil for possible UXO prior to off-site disposal. In late January and early February 1997, excavation activities resumed after disposal of the UXO and the soils were moved to the stockpile area north of the firing line and covered with plastic.

During the excavation activities, confirmation sampling was performed at Site 14 to determine the adequacy of the removal action. The sample results indicated that most metals are at levels below USEPA Region 9 criteria. One exception is chromium, which was found to exceed the criteria in six samples. In spite of these elevated chromium results, groundwater data at Site 14 show that chromium is at background levels. This indicates that chromium contamination in the subsurface soils has not migrated vertically to the groundwater pathway.

Arsenic concentrations were consistent with background concentrations for JPG. Soil pH was found to range from 2.3 to 7.6 with 13 of the 24 samples having a pH of less than 4, indicating that an acidic environment still exists within portions of the yellow sulfur area following contaminant removal.

Based on additional UXO screening conducted during the ecological risk assessment sampling in September 1997, UXO may potentially exist outside the open excavation in the shallow subsurface (within 2 ft of the surface). UXO was also encountered during the excavation of the yellow sulfur contamination. Additional UXO screening and removal would be necessary before unrestricted access to the site could be given.

To summarize, based on the RI sampling results and interim measures confirmation sampling, it appears that chromium contamination exceeding USEPA Region 9 PRG exists in subsurface soils at Site 14. Continuation of the current interim measures removal action should include additional excavation and disposal based on an agreed upon cleanup goal for chromium in soil. The potential for UXO still exists outside the open excavation area within 2 ft of the surface. In groundwater, arsenic contamination was present in all four wells at levels exceeding USEPA Region 9 PRGs.

#### **Summary of Potential Risk - Site 14**

Based on the results of the human health risk assessment for Site 14, the primary exposure pathway(s) and COCs that pose a potential human health concern are described below for the residential land use scenario. The intended future land use is agricultural, however the site may be used for residential.

The critical exposure pathway for both residential receptors (adult and child) is ingestion of groundwater, and arsenic is the sole noncarcinogenic and carcinogenic COC.

Site soils do not represent a potential human health risk under any land use scenario; however, additional soils removal will be performed as a continuation of the 1996/97 removal action to remove residual contamination of chromium to meet USEPA Region 9 residential PRGs.

The result of the ecological assessment performed during the RI for Site 14 indicated that there is no significant ecological risk at this location based on evaluation of the different lines of evidence.

### **Remedial Action Objectives - Site 14**

The site-specific and land-use specific RAOs for soils and groundwater at Site 14 are as follows for residential land use:

- Prevent exposure to groundwater to reduce noncancer and cancer risks to acceptable levels. If it is determined through monitoring that arsenic is background or naturally occurring, further monitoring will be unnecessary and cease. If arsenic is found not to be background or naturally occurring, then groundwater containing elevated concentrations of arsenic will be addressed to mitigate risk. This could be accomplished by mitigating exposure to groundwater containing concentrations of arsenic that are above the MCL of 10 ug/L. Contaminant MCLs were taken from the USEPAs July 2002, National Primary Drinking Water Standards, located at <http://www.epa.gov/safewater/mcl.html>.
- No RA is required for soil. Although no risk remains from soils at Site 14, soils will be excavated to remove the residual chromium noted in the confirmation sampling associated with the 1996/1997 removal action. The USEPA 2002 Region 9 PRG for chromium VI is 30.1 mg/kg. Confirmation sampling will be performed for metals, including antimony.

### **Alternatives for Groundwater – Site 14**

After review of the applicable response actions and process options, the following three alternatives were formulated for groundwater remediation:

- |               |                                                        |
|---------------|--------------------------------------------------------|
| Alternative 1 | No-Action                                              |
| Alternative 2 | Limited Action (Institutional Controls and Monitoring) |
| Alternative 3 | Collection and Treatment                               |

**Groundwater Alternative 1: No-Action.** Under this alternative, site water would remain without change except through possible natural attenuation. This alternative does not meet the RAOs for possible future residents. Drinking water MCLs are not met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time.

**Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring).** This alternative does not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. Deed and/or land use restrictions would be

developed for future protection if the property were released to the public. This option would not preclude risk to human health and the environment unless monitoring demonstrated that groundwater arsenic contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collecting the contaminated water and treating it to remove metals. A pumping system would collect the water to reduce arsenic concentrations and control groundwater flow, followed by a relatively simple chemical precipitation treatment after which the clean water would be disposed of to the existing surface water system and the collected metals disposed of in a regulated landfill. Because arsenic contamination would be removed from the groundwater, this alternative will likely meet the RAOs. Arsenic concentrations may be reduced to MCLs. However, a waiver of the ARARs may be necessary should the occurrence of arsenic be determined through monitoring to be naturally occurring and not technically feasible to remediate. By treating the collected water, human health remediation goals may be met for future receptors. The property could be released without restriction.

#### **Evaluation of Alternatives for Site 14**

Table 7 provides a comparative analysis of Alternatives 1 through 3 for Site 14 groundwater. Relative rankings of the three remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. Alternative 2 - Limited Action (Institutional Controls and Monitoring) earns the highest relative ranking. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in Table 7, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for arsenic contaminated groundwater at Site 14.

Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of arsenic in groundwater. Monitoring of groundwater will provide information about the nature and occurrence of the arsenic in groundwater.

Additional excavation and disposal of contaminated soils at Site 14 to complete the previous removal action will be performed. This may result in removal of the source of elevated metals found in groundwater at Site 14. This soils removal action will include UXO support during excavation.

The Army, IDEM, and USEPA concur with this alternative.

## **SITES 21A/30 - BUILDING 204 TEMPORARY STORAGE AREA**

Building 204 is located one block east of the intersection of Woodfill Road and Meridian Road. A variety of pesticides and herbicides have been stored in Building 204. A small metal shed southeast of Building 204 was used for mixing and rinsing pesticides and herbicides. Spills of these materials during loading, unloading, storage, or mixing may have resulted in a release of contaminants to environmental pathways. The integrity of the concrete slab within the building was evaluated by USACE and found to be in good condition, therefore, no sampling of soils beneath the concrete slab will be performed.

Some soil contamination (dieldrin) is present around the building. No significant residual contamination remains inside the building related to any unreported releases that may have occurred.

### **Summary of Potential Risk - Sites 21A/30**

Based on the results of the human health risk assessment, the primary exposure pathway(s) and COCs that pose a potential human health concern are described below for the residential land use scenario. Although Sites 21A/30 are intended for industrial use, nearby properties are currently used for residential and given the proximity of these sites, Sites 21A/30 may pose an increased risk to those residents. Therefore, the RAOs for residential use are included.

The critical exposure pathway for both residential receptors (adults and children) is incidental ingestion of soil and ingestion of fruits/vegetables grown in surface soil at these sites. Dieldrin is the sole COC.

Based on protocols established in the PERA (Rust E&I 1997b), there were no potential ecological risks determined for Sites 21A and 30.

### **Remedial Action Objectives – Sites 21A/30**

The site-specific and land-use specific RAOs for soils at Sites 21A/30 are as follows for residential land use:

- Remediate the soils to reduce cancer and noncancer risks to acceptable levels. This would be accomplished by remediation of soils containing elevated concentrations of dieldrin to levels that are below USEPA Region 9 residential soil PRGs or background concentrations, whichever is higher. The USEPA 2002 Region 9 PRG for dieldrin is 0.03 mg/kg.

### **Alternatives for Soils – Sites 21A/30**

The retained process options were further analyzed and screened to the following three RA alternatives:

- |               |                                         |
|---------------|-----------------------------------------|
| Alternative 1 | No-Action                               |
| Alternative 2 | Limited Action (Institutional Controls) |
| Alternative 3 | Excavation and Disposal                 |

**Soils Alternative 1: No-Action.** Under this alternative, site soil would remain in place. This alternative does not meet the RAOs if, in the future, a residence is built on the site. There would be no long-term or permanent reduction in risk with this alternative. There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.

**Soils Alternative 2: Limited Action (Institutional Controls).** This alternative does not involve active remediation; site soils would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by placing controls on access to the site. Deed restrictions would be developed for future protection when the property is released to the public. The restrictions would prevent the use of the property for residential and industrial development. Construction of a fence around the small contaminated area plus deed restrictions would minimize exposure to the surface-contaminated soil by humans and grazing animals for future land use options. This option would not preclude risk to human health and the environment.

The human health risk assessment indicates that the residual risk for this alternative would meet current and future worker human health goals but would not meet future residential goals. By using fencing and deed restrictions to restrict access to and development of the area, human health remediation objectives could be met. In addition, restrictions on utilization of this land for agricultural purposes would be required based on the estimated risks from ingestion of dieldrin in homegrown produce.

**Soils Alternative 3: Excavation and Off-Site Disposal.** This alternative involves the removal of contaminated soil exceeding the PRGs established for dieldrin. The use of standard lightweight excavation equipment could be utilized because of the relatively shallow and small area of contaminated soil. Confirmation samples would then be collected to verify that any residual contamination is below the PRG. Clean soil from an on-site borrow area would be used to backfill the excavation after the confirmation sample results are reviewed and approved. Removal and proper disposal of contaminated soils exceeding PRGs would effectively reduce risk to human health and the environment due to both current and future potential exposure. The PRGs would be met under this alternative.



### **Evaluation of Alternatives for Sites 21A/30**

Table 8 provides a comparative analysis of Alternatives 1 through 3 for Sites 21A and 30 soils. The table ranks the alternatives using a scale of 1 to 10, ten representing the best alternative for the criteria being evaluated. The rankings are totaled for each alternative in the table. Based on the totals, the best alternative for site soil remediation is Alternative 3 - Excavation and Off-Site Disposal. In addition, Table 9 provides a summary of Proposed Plan costs.

Based on the detailed screening performed in Table 8, Alternative 3 – Excavate/Dispose is the recommended RA for pesticide-contaminated soils at Sites 21A and 30. This RA would allow free access to the property and would require no long-term presence.

The Army, IDEM, and USEPA concur with this alternative.

## TABLES

**TABLE 1**  
**Comparative Analysis of Remedial Alternatives for Soils**  
**Sites 3 and 4- Abandoned Landfill and New Burn Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Does not meet future human health objectives. Does not meet current environmental objectives.	Does not meet possible future human health standards.	Does not meet remediation goals for future use.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	1	1	1	1	10	10	10	--	--	34
Alternative 2: Limited Action-Institutional Controls	Human health and environment risk minimized, but not eliminated.	Does not meet possible future human health standards.	Meets human health remediation goals for soils. Residential use precluded. Long-term maintenance required.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	Health concerns are the construction hazards associated with installation of a fence. Minimal wildlife disruption is expected.	Readily implementable.	\$110,000		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	5	1	5	1	8	9	8	--	--	37
Alternative 3: Excavation and Off-Site Disposal	Identified risk to human health and environment eliminated.	Meets ARARs.	Land could be released for unrestricted use.	Toxicity, mobility and volume of contamination are removed from JPG by this alternative.	Health concerns are the construction hazards associated with excavation and backfill operations. Minimal wildlife disruption is expected.	Readily implementable.	\$1,861,000	IDEM and USEPA concur with this alternative.	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	8	2	6	2	--	--	48

## Footnotes:

- (a) Applicable or relevant and appropriate requirements.
- (b) Occupational Safety and Health Act.

**TABLE 2**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 3 - Explosive Burn Area and Site 4 - Abandoned Landfill and New Burn Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Alternative does not meet future human health objectives. Case B may meet objectives over time.	Drinking water MCLs <sup>(b)</sup> may be met given enough time for natural attenuation to occur.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	2	2	2	2	10	10	10	--	--	38
Alternative 2: Limited Action (Institutional Controls and Monitoring).	Human health and environment risk protected by land use restrictions and monitoring.	Drinking water MCLs <sup>(b)</sup> may be met given enough time for natural attenuation to occur.	Meets human health and ecological remediation goals. Monitoring required.	There is no reduction of the toxicity, mobility, or volume of contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	\$880,000	IDEM and USEPA concur with this alternative.	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	2	10	2	10	10	6	--	--	50

## Footnotes:

- (a) Applicable or relevant and appropriate requirements.  
(b) Maximum Contaminant level.

**TABLE 3**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Sites 7/21B**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No Action	Does not meet future human health objectives, but may meet objectives over time.	Drinking water MCLs <sup>(b)</sup> are not met.	Does not meet remediation goals for future use other than through possible attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during public comment period.	
<b>Ranking</b>	2	2	2	2	10	10	10	--	--	38
Alternative 2: Limited Action Institutional Controls and Monitoring	Human health and environment risk protected by land use restrictions and monitoring.	Drinking water MCLs <sup>(b)</sup> are not met.	Meets human health and ecological remediation goals. Monitoring required.	There is no reduction of the toxicity, mobility, or volume of contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	\$383,000	IDEM and USEPA concur with this alternative.	To be evaluated during public comment period.	
<b>Ranking</b>	8	2	8	2	10	10	8	--	--	48
Alternative 3: Collection and Treatment	Meets the remedial action objectives of protecting human health and the environment.	Drinking water MCLs may be met. Unknown effectiveness for reducing arsenic concentrations.	Land could be released for unrestricted use. Unknown effectiveness for reducing arsenic concentrations.	Toxicity, volume and mobility of contamination are removed by this alternative. Unknown effectiveness for reducing arsenic concentrations.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable.	\$611,000		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	8	6	6	4	6	6	6	--	--	42

## Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements.  
(b) Maximum contaminant level.

**TABLE 4**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 12A - Building 602 Solvent Pit**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
<b>Alternative 1: No Action</b>	Does not meet future human health objectives until natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	2	5	2	6	10	10	10	--	--	45
<b>Alternative 2: Limited Action (Institutional Controls &amp; Monitoring)</b>	Human health and environment risk protected by use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Meets human health and ecological remediation goals. Monitoring required. Land could possibly be released for unrestricted use.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Readily implementable.	\$688,000	IDEM and USEPA concur with this alternative	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	5	10	6	10	10	6	--	--	57
<b>Alternative 3: Collection and Treatment</b>	Meets the RAOs of protecting human health and the environment.	Drinking water MCLs are met.	Meets human health and ecological remediation goals. Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative, if successful. Difficult to remove groundwater.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable. Construction required. Difficult to remove groundwater	\$80,210		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	8	5	3	4	--	--	50

Footnotes:

- (a) Applicable Relevant and Appropriate Requirements.  
(b) Maximum Contaminant Level.

**TABLE 5**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 12B - Building 617**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
<b>Alternative 1: No Action</b>	Does not meet future human health objectives until natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	2	5	2	6	10	10	10	--	--	45
<b>Alternative 2: Limited Action (Institutional Controls &amp; Monitoring)</b>	Human health and environment risk protected by land use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Meets human health and ecological remediation goals. Monitoring required. Land could possibly be released for unrestricted use.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Readily implementable.	\$798,000	IDEM and USEPA concur with this alternative	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	5	10	6	10	10	6	--	--	57
<b>Alternative 3: Collection and Treatment</b>	Meets the RAOs of protecting human health and the environment.	Drinking water MCLs are met.	Meets human health and ecological remediation goals. Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative, if successful. Difficult to remove groundwater.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable. Construction required. Difficult to remove groundwater.	\$1,051,080		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	8	5	3	4	--	--	50

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements  
(b) Maximum Contaminant Level

**TABLE 6**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 12C - Building 279**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
<b>Alternative 1: No Action</b>	Does not meet future human health objectives until natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	2	5	2	6	10	10	10	--	--	45
<b>Alternative 2: Natural Attenuation with Institutional Controls</b>	Human health and environment risk protected by land use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Meets human health and ecological remediation goals. Monitoring required. Land could possibly eventually be released for unrestricted use.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Readily implementable.	\$439,000	IDEM and USEPA concur with this alternative	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	5	10	6	10	10	6	--	--	57
<b>Alternative 3: Collection and Treatment</b>	Meets the RAOs of protecting human health and the environment.	Drinking water MCLs are met through restriction of use.	Meets human health and ecological remediation goals. Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable. Construction required.	\$615,000		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	10	5	5	4	--	--	54

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements.  
(b) Maximum Contaminant Level.



**TABLE 7**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 14 - Yellow Sulfur Disposal Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Does not meet future human health objectives unless natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> are not met.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	2	2	2	2	10	10	10	--	--	38
Limited Action (Alternative 2: Institutional Controls and monitoring)	Human health and environment risk protected in short term by land use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs are met through restriction of use.	Meets human health and ecological remediation goals. Long-term surveillance required. Land could possibly eventually be released for unrestricted use.	Toxicity, mobility, or volume of contaminants are eliminated through treatment under this alternative. natural attenuation may eventually reduce contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Implementable.	\$340,000	IDEM and USEPA concur with this alternative	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	2	10	10	6	--	--	58
Alternative 3: Collection and Treatment	Meets the remedial action objectives of protecting human health and the environment.	Drinking water MCLs are met.	Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable.	\$540,000		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	10	4	5	5	--	--	54

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements.  
(b) Maximum contaminant level.

**TABLE 8**  
**Comparative Analysis of Remedial Alternatives for Soils**  
**Sites 21A/30 –Building 204 Temporary Storage Area**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Does not meet future human health objectives. Does not meet current environmental objectives.	Does not meet possible future human health standards.	Does not meet remediation goals for future use.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	1	1	1	1	10	10	10	--	--	34
Alternative 2: Limited Action-Institutional Controls	Human health and environment risk minimized, but not eliminated.	Does not meet all future human health standards.	Meets human health remediation goals for soils. Residential use precluded. Long-term maintenance required.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	Health concerns are the construction hazards associated with installation of a fence. Minimal wildlife disruption is expected.	Readily implementable.	\$92,000		To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	6	6	4	2	8	9	6	--	--	41
Alternative 3: Excavation and Off-Site Disposal	Identified risk to human health and environment eliminated.	Meets ARARs.	Land could be released for unrestricted use.	Toxicity, mobility and volume of contamination are removed from JPG by this alternative.	Health concerns are the construction hazards associated with excavation and backfill operations. Minimal wildlife disruption is expected.	Readily implementable.	\$117,000	IDEM and USEPA concur with this alternative	To be evaluated during the public comment period that will follow release of the RI and FS reports to the community.	
<b>Ranking</b>	10	10	10	8	2	6	5	--	--	51

Footnotes:

(a) Applicable or Relevant and Appropriate Requirements.

TABLE 9

**Summary of Proposed Plan Alternatives Costs  
Jefferson Proving Ground  
Madison, Indiana**

<b>Summary</b>		
<b>Alternative Type and Location</b>	<b>Site</b>	<b>Total Costs</b>
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Sites 3, 4, and the New Burn Site - Groundwater RA at 30 years of groundwater monitoring	\$2,056,000
Alternative 3 - Soils Excavation & Off-Site Disposal	Sites 3, 4, and the New Burn Site - Soils RA	\$1,861,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 7/21A - Groundwater RA at 20 years of groundwater monitoring	\$710,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 12A - Groundwater RA at 30 years of groundwater monitoring	\$1,640,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 12B - Groundwater RA at 30 years of groundwater monitoring	\$1,791,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 12C - Groundwater RA at 20 years of groundwater monitoring	\$814,000
Continued Soil Removal Excavation and Off-Site Disposal	Site 14 - Yellow Sulfur Disposal Site - Soils RA	\$224,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 14 - Yellow Sulfur Disposal Site - Groundwater RA at 20 years of groundwater monitoring	\$627,000
Alternative 3 - Soils Excavation & Off-Site Disposal	Sites 21A and 30 - Soils RA	\$117,000

Total Cost for All Alternatives      \$9,840,000

Present Net Worth for All Alternatives

## FIGURES

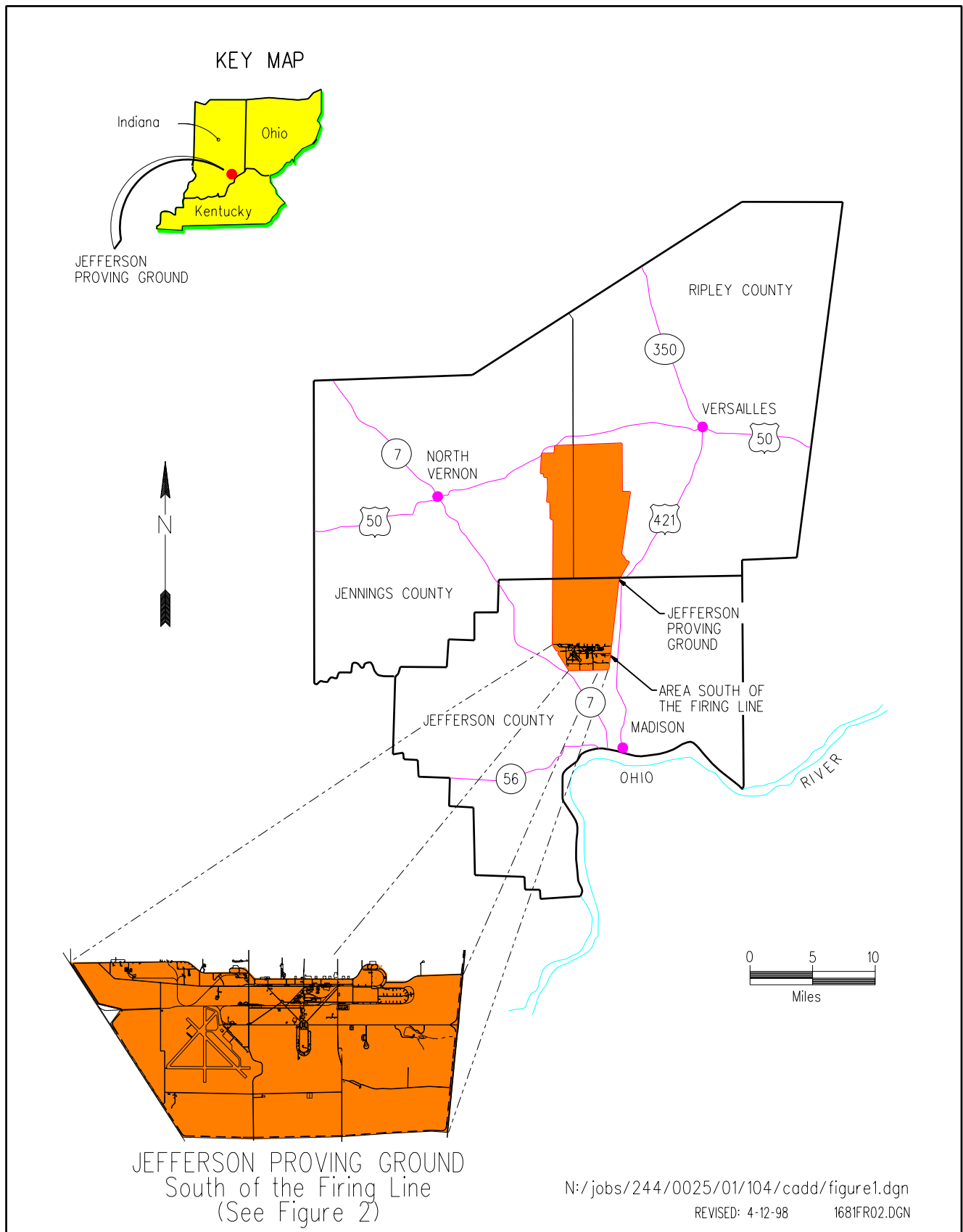
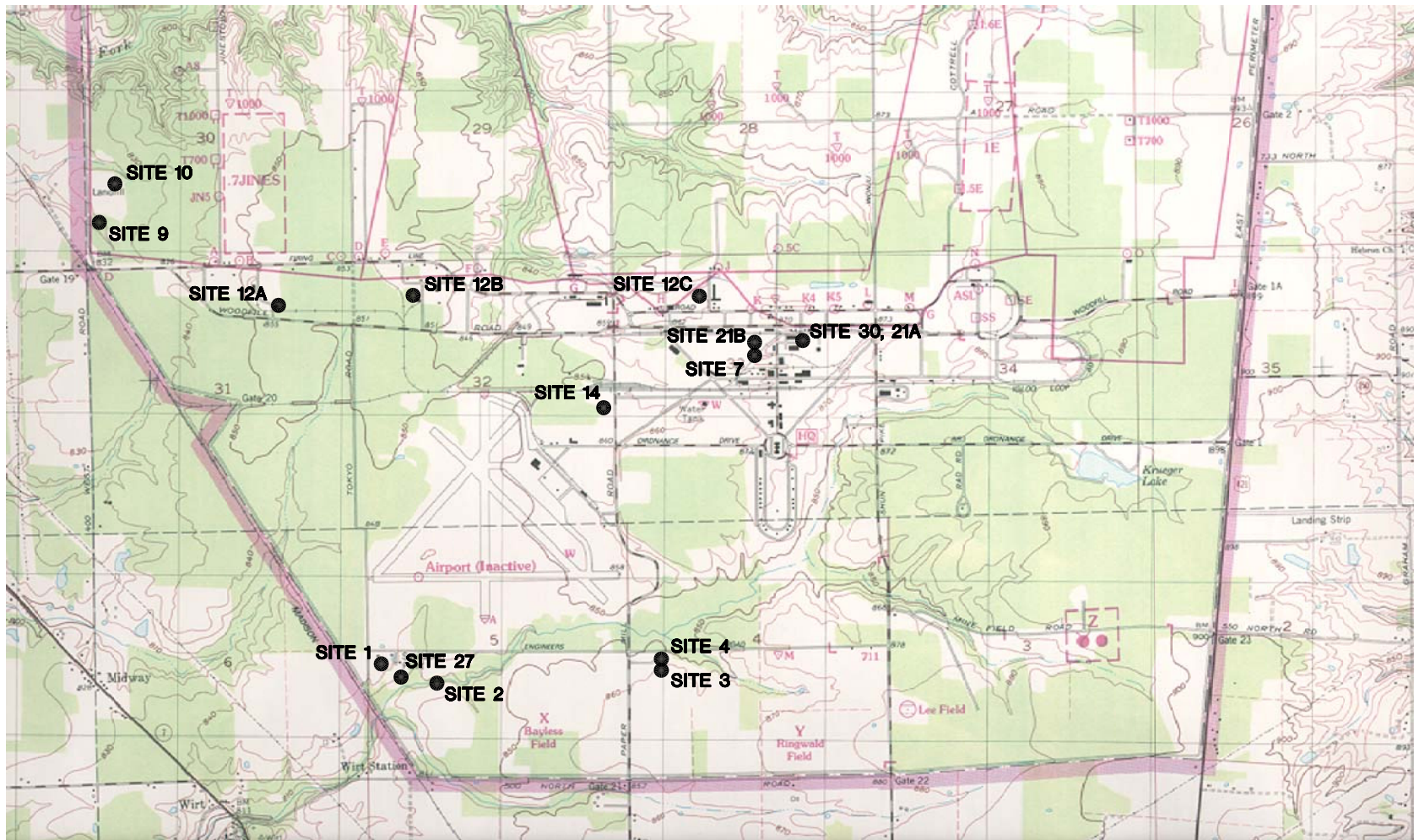


Figure 1. Site Location Map



# **LEGEND**

● **SITE 3** SITE LOCATION AND NUMBER

# **NOTES**

1. BASE MAP DEVELOPED FROM A U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP PREPARED FOR UNITED STATES ARMY: JEFFERSON PROVING GROUND, INDIANA, DATED 1986.
2. SITES SUBJECT OF THE FS: SITES 1, 2 AND 27, 3 AND 4, 7 AND 21B, 9 AND 10, 12A, 12B, 12C, 14, 21A AND 30.
3. SITES NUMBER 30 AND 21A BOTH REFER TO TEMPORARY STORAGE AREA (BUILDING 204).

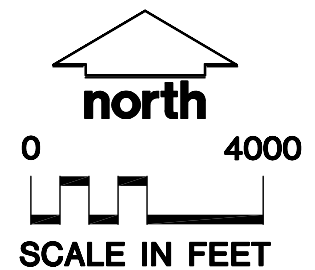


Figure 2. Location of Sites Subject of the FS and Proposed Plan

## **APPENDICES**

## **A**

### **COMMENTS/RESPONSES ON FS**

A1	USEPA
A2	IDEM
A3	RAB
A4	Meeting Minutes - Resolution of Geology Issues
A5	Comments and Responses on the Draft Proposed Plan
A6	Comments and Responses on the Draft-Final Proposed Plan



**A1**

**USEPA**

Resolution of USEPA Comment and Army Response  
Draft Final Feasibility Study Dated March 2003  
Jefferson Proving Ground

	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
GENERAL COMMENTS			
1.	In general, the FS did not fully address our ecological risk concerns with the Remedial Investigation (RI). The investigation continues to rely primarily, if not solely in some cases, on comparisons to reference areas/background conditions as evidence for the lack of ecological risk. Although at this stage in the Ecological Risk Assessment process those comparisons can be used in assessing ecological risk, they should not be the <b>only</b> line of evidence. Indeed, for Site 9, the document acknowledges a degree of uncertainty and the possibility of risk in the aquatic system because no comparisons to a reference area sediments was done. There was no mention of Hazard Quotient (HQ) analysis or toxicity testing for the Site 9 aquatic ecosystem.	<p>Comment is not applicable to the FS but rather challenges results and conclusions already addressed in the Final RI. It was agreed as part of the DERA Work Plan that additional lines of evidence would be collected (e.g., toxicity testing) at specific sites for purposes of the ERA. All lines of evidence agreed to are presented in the Final ERA. For some sites (or portions of site) only hazard quotients (HQs) are available as a line of evidence.</p> <p>The HQ analysis for the specific case of the Site 9 pond is detailed in the <i>Final Phase II Remedial Investigation, Jefferson Proving Ground, Madison Indiana</i>, September 2003 by MWH (Final RI). It should be noted that the FS only provides summaries of the information provided in the RI report. Vanadium was the primary COC for ecological receptors using the pond. To address uncertainties related to these HQ estimates as part of the RA activities, vanadium will be resampled in the pond sediment to determine if the results of the Phase 1 sampling are representative of current site conditions. In addition, sediment data from a background water body may be collected if necessary to put into perspective the vanadium metals concentrations detected in the pond. Alternatively currently available MiddleFork Creek data could also be used to represent typical background concentrations of vanadium in sediments at JPG.</p>	<p>It was agreed by all that additional sampling for vanadium in the pond sediments is not required (and would not add additional value) based on the following:</p> <ul style="list-style-type: none"><li>• Vanadium concentrations from Middle Fork Creek are comparable to those in the pond sediments.</li><li>• Middle Fork Creek is not expected to be impacted by surface water run-on, therefore can serve as background for sediment sampling.</li><li>• Bioassay tests were performed for Site 9 and show no apparent effects.</li></ul>
2.	The FS uses vague terms such as “appears to be comparable to background levels” without providing (or referring to) quantitative data to support that claim. The use of “appears” in itself is not necessarily problematic; however, this particular statement implies that there is no supportive data.	Comment is not applicable to the FS. The Final RI is referenced and contains the supporting data. The wording is correct, no statistical analysis was performed to give a more detailed level of confidence.	Response is adequate – no additional response is needed.
3.	U.S. EPA believes that the ecological risk assessment issue regarding the use of Hazard Indexes (HIs) was never satisfactorily resolved. They are not strong lines of evidence (again, relying entirely on comparisons to background levels). The Contaminants of Concern (COCs) that made up each HI should have been broken out and the respective Hazard Quotients (HQs) examined individually. It is possible that this approach may more definitively rule out potential ecological risk, but it would certainly help to elucidate which particular COCs are most likely responsible for any potential ecological risk.	Comment is not applicable to the FS. The supporting evaluation for the key analytes posing the greatest potential ecological risk are provided by HQ in the Final RI.	USEPA agreed that the response is adequate.
4.	Sites 28/29/39 (Gator Z Mine Areas) were not addressed at all in the FS. The Army’s explanations (found in the Response-to-Comments from Final RI Report, September 2002) for not carrying them forward as part of the FS were not fully satisfactory.	<p>Comment is not applicable to the FS. Based on the results of the Phase I RI, the interim removal actions subsequent confirmatory sampling, and the human/ecological risk assessment, Sites 28, 29, and 39 are recommended for No Further Action under the RI/FS process being conducted at JPG, thus were not addressed in the FS. The following summarizes the rationale presented in the Final RI and summarized in the FS for this decision:</p> <ul style="list-style-type: none"><li>• Sites 28/29. Confirmation samples performed during the interim measures removal actions confirmed that contaminants exceeding USEPA Region 9 risk-based PRGs at Sites 28 and 29 were removed.</li><li>• For Site 28, confirmation samples collected in the temporary stockpiles soil area confirmed no contamination above USEPA Region 9 PRGs remained.</li></ul>	<p>USEPA indicated that their concern is for eco risk. The team visited Sites 28, 29, and 39 and based on that site visit, it was agreed that site 39 is no risk and no further response is needed for Site 39.</p> <p>For Sites 28 and 29, USEPA wants to see a quantitative analysis of eco risk for these sites. It was clarified that a quantitative analysis had been done for these sites and were contained in Section 22 of the Final RI. USEPA’s ecological risk assessor reviewed these materials and agreed that these evaluations would be satisfactory to address this comment.</p>

**Resolution of USEPA Comment and Army Response  
Draft Final Feasibility Study Dated March 2003  
Jefferson Proving Ground**

	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
4. Cont.		<p>No contamination above PRGs remains, therefore no health/ecological risk exists.</p> <ul style="list-style-type: none"><li>For Site 39, the HHRA (contained in the RI) indicated that Site 39 does not pose risk or hazards to future on-site residents or to future on-site workers.</li><li>The ecological risk assessment for Site 39 indicates that the site does not pose a risk to ecological systems as well.</li><li>It appears that there was concern regarding aquatic receptors associated with the drainage features at Site 39. Please note that only one of the samples within the drainage ditch had contamination exceeding background.</li><li>In addition and more to the point, no continuous ponded water is present on Site 39. Two drainage features transverse the site. Both features receive surface storm water from the center and eastern portion of the site and transport the water west along the southern boundary of the site. These are drainage ditches and are dry most of the year, therefore cannot support aquatic life.</li></ul> <p>No health/ecological risk exists at Site 39</p>	
5.	Bioaccumulation studies, as recommended by EPA, were apparently not done. Toxicity testing was not consistently done in all sites and habitats under consideration.	Comment is not applicable to the FS. Bioaccumulation studies were requested by USEPA after the Draft Final RI had been prepared. The Army already has responded to USEPA’s request and explained that no bioaccumulation studies will be performed. Within the approved DERA Work Plan toxicity testing was specified for only specific sites that warranted testing and this is why toxicity testing is not available for each site.	<p>Per the meeting notes of the 26 June 03 conference call - USEPA says comment still holds and that the Army could have performed the studies between the draft final and final RI reports. MWH and USACE pointed out the bioaccumulation studies are not warranted at JPG due to the size of the sites, receptors, type of land use, and the conservative nature of the risk assessment. It would not add significant value to the ERA, but would have taken at least an additional year to complete the work. It was also pointed out that other refinements to the ERA would likely be more appropriate and less costly than performing bioaccumulation studies.</p> <p>During the face to face meeting, USEPA agreed (after a site visit to Sites 9, 28, 29, 39, and a discussion about actual benefit or lack of benefit of such studies) that bioaccumulation studies are not necessary and no further response is needed.</p>
6.	All of the issues listed above in Comments #1-5 suggest that the conclusion that ecological risk does not exist and apparent dismissal of potential ecological risk when considering remedial alternatives are not wholly justified.	Because Comments #1 – 5 are not applicable to the FS, this conclusion has no relevance to the FS and no response is necessary.	No additional response is needed.
7.	On Page 1-1 of the introduction under Section 1.1, third paragraph, U.S. EPA recommends changing ....”did not pose a risk to human health” ... to something less absolute like ...” <i>did not appear to pose a risk to human health</i> ”....	Comment will be incorporated.	No additional response is needed.
8.	The RI keeps referring to sites South of the Firing Line as if all of the sites are located there, but there are a few of the sites located North of the Firing Line. Recommend to change the wording to address this situation.	Comment is not directed to the FS, but for the sake of clarity the comment will be incorporated as a modification to the FS.	No additional response is needed.
9.	In the residential (adult & child) and industrial worker scenarios the human health risk assessment includes risk associated with lead, lead paint, asbestos, UXO's, tank cars on railroad tracks and their residues on the tracks since this is part of the site. It is recommended that for each human health risk assessment the appropriate inclusions or exclusions of these type of materials (chemicals) be stated clearly since they do affect human health and particularly children's health.	Comment is not applicable to the FS. Also, these are not part of the risk assessment scope. UXO is a safety issue, however the Army has received a “Statement of Clearance” for UXO for the entire parcel, which is documented in the transfer documents. The tank cars are the responsibility of the Madison Rail Road Commission as documented in the property transfer documents. Lead and asbestos are the responsibility of the future landowners.	<p>Per the meeting notes of the 26 June 03 conference call, USEPA says comment still holds and they feel the risk assessment should address risk associated with lead paint, asbestos, UXO, and tank cars located at the installation. MWH and the Army explained that these are not normally issues that are addressed in a Baseline Risk Assessment. In addition, it was reiterated that these issues were being addressed separately, or were the responsibility of the future landowners.</p> <p>At the meeting, USEPA accepted the response. No additional response is needed.</p>

Resolution of USEPA Comment and Army Response  
Draft Final Feasibility Study Dated March 2003  
Jefferson Proving Ground

	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
10.	Under Exposure Assessment, it states that Jefferson Proving Ground (JPG) is currently a closed, fenced, former munitions/weapons testing facility which would include trespassers to JPG and off-facility rural residents. There are currently industrial areas with workers and housing for residents on the property and U.S. EPA’s recommendation is to include them in the statement.	Comment will be incorporated.	No additional response is needed.
11.	A facility background sample is really a facility site background sample and not a background sample used for comparing what is found in a sample at a site with contaminants to a comparable site without contaminants or just with naturally occurring contaminants to only that type of land area. It is recommended that when background samples are used for JPG these background samples be taken from somewhere off the JPG site.	Comment is not applicable to the FS. The background samples were collected as agreed to by USEPA, IDEM, and the Army from three specific soil series at specific locations on the facility during the RI. Without compelling justification, the Army will not revisit background for soils at this late date in the process.	<p>USEPA focused on whether the background locations selected could be verified to be true background sample locations. USEPA’s contractor proposed using a comparative analysis of the dioxin congener fingerprints in the background and investigative samples to determine if the samples were from similar sources. This, in their opinion, would provide additional verification that the background samples had been appropriately selected. Jamie DeWitt (RAB representative) volunteered to review dioxin background information and perform the comparative analysis of the congeners in the background and investigative samples for site 1. Refer to Appendix B3 for the dioxin resolution.</p> <p>USEPA’s contractor also brought up the concept of performing a residual risk analysis to evaluate the risk of analytes that were considered at background concentrations along with the analytes that were carried forward into the risk assessment. After much discussion, this type of analysis was potentially useful for Sites 1 and 2/27. The USEPA will evaluate whether that would be needed in light of their review of background. Army indicated that at this late date, such an analysis would not be performed, and would add little to no additional value to the project. This is primarily because dioxin risks were the main risk driver of the analytes that were considered at background concentrations at these sites, and the risk estimates for dioxins had already been assessed in the risk assessment. So in essence, a partial residual risk analysis has already been performed for these sites.</p>
12.	In the Overview of the FS Process the UXO situation should be mentioned as an area of concern for the Site.	Comment is not applicable to the FS. UXO clearance is performed under a separate contract and to date, the Army has received a “Statement of Clearance” for sites south of the firing line, thus UXO is not an issue for the RI/FS.	No additional response is needed.
SPECIFIC COMMENTS			
1.	<p>Executive Summary, page ES-1, paragraphs 3-4: the FS does not include the correct nine CERCLA evaluation criteria which includes U.S. EPA as a part of <b>regulatory acceptance</b>. Add “<i>U.S. EPA</i>” and State under “<i>Regulatory Acceptance</i>,” not just “State Acceptance.” Deleting U.S. EPA’s name from the regulatory acceptance process is not in line with the standard operating procedures of a Base Realignment and Closure (BRAC) Cleanup Team (BCT). The BCT consists of three members (DoD, IDEM and U.S. EPA).</p> <p>Has the State (IDEM) performed either a human health or ecological risk assessment review of the RI and FS? In all of the previous reviews of the RI and various other environmental investigation documents for JPG, the State (IDEM) has deferred all risk assessment reviews, recommendations and decisions to U.S. EPA due to a lack of resources.</p>	Comment noted – USEPA will be added as requested. The Army is the lead federal agency.	No additional response is needed.

**Resolution of USEPA Comment and Army Response  
Draft Final Feasibility Study Dated March 2003  
Jefferson Proving Ground**

	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
2.	<p>Site 1 - Building 185 Incinerator: The incinerator stack appears to be an area that was not sampled for dioxin/furan, if this is so, it is recommended that this be sampled. Since this site is a potential agricultural and residential use area, it is recommended to use the exposure doses for 2,3,7,8-TCDD equivalents detected in soils, for beef and milk consumption, inhalation of dust and any associated exposure pathway in the human health risk assessment.</p> <p>U.S. EPA does not concur with the Army’s recommendation for no further action (NFA) at this site. Recommend that Site 1 be carried further through the FS process and place institutional controls on it limiting residential and agricultural development.</p>	<p>Dioxins were sampled during the investigation – refer to Section 6 of the Final RI and Section 3 of the FS, which summarizes that information. The dioxin concentrations in the soil at Site 1 are at concentrations that are comparable to background, which are unrelated to previous activities at Site 1. In addition, the other COC, manganese, occurred at a maximum concentration that is well below the current USEPA Region 9 full residential PRG. Therefore, Site 1 is recommended for no further action, unrestricted use.</p>	<p>Refer to Appendix B3 for additional information on Site 1 dioxins concerns.</p>
3.	<p>Site 2 - Sewage Treatment Plant and Site 27 - Sewage Sludge Application Area: In Section 4.4.2, Exposure Assessment it is stated that a site-wide area-weighted concentration for each surface soil COPC was calculated by multiplying the concentration of the COPC in soil in the sub-area of potential concern by a modifying factor. It is recommended this not be used and instead the actual highest concentration be used for the human health risk assessment in the residential, agricultural and industrial worker scenarios.</p> <p>It is recommended that the drainage pathways and surface water bodies should be included in all the risk assessment scenarios. U.S. EPA does not concur with the Army’s recommendation for no further action (NFA) at this site. Recommend that Sites 2 and 27 be carried further through the FS process and place institutional controls on them limiting residential and agricultural development.</p>	<p>Comment noted. No response necessary.</p>	<p>After discussion, the team concluded that no additional response is needed. However USEPA's contractor asked for clarification why a site-wide area-weighted concentration was used in some cases in the risk assessment. MWH volunteered to try to obtain the answer to their question, but the decision to use this approach predated MWH involvement.</p>
4.	<p>Site 3 - Explosive Burning Area and Site 4 - Abandoned Landfill and New Burn Site: In Section 5.4.2 - Exposure assessment it is stated that a site-wide area-weighted concentration for each surface soil COPC was calculated by multiplying the concentration of the COPC in soil in the sub-area of potential concern by a modifying factor. It is recommended this not be used and instead the actual highest concentration be used for the human health risk assessment in the residential, agricultural and industrial worker scenarios.</p>	<p>Comments are not applicable to the FS. Risk Assessment workplans were prepared and approved years ago and the Risk Assessment was summarized in the RI.</p>	<p>After discussion, the team concluded that no additional response is needed.</p>
	<p>In Section 5.4.3 - Risk Characterization, it is recommended that they check the statement that there is no US EPA health criteria for lead. It is recommended that the children's exposure calculations to lead be done with the highest concentrations found on the site.</p>	<p>The sentence that states that “There are currently no USEPA health criteria for lead.”, will be removed and replaced with the following: “Currently there are no USEPA approved toxicity values that can be used to develop HQs for lead. Rather, the ..... “</p> <p>For purposes of the human health risk assessment it was agreed as part of the Work Plan that the soil lead concentrations would be compared to the 400 mg/kg OSWER directive screening value rather than performing any formal modeling. The 400 mg/kg value is based on modeling performed by USEPA using the Integrated Exposure Uptake Biokinetic (IEUBK) model for lead using conservative residential exposure assumptions for young children. It should be noted that the highest concentration of lead was compared to the 400 mg/kg screening value for lead. However, this is considered conservative, because the IEUBK technical guidance document suggests using the arithmetic average soil lead concentration as the input for estimating lead exposure to children. For this reason, it is acceptable to compare the average soil lead concentration to the screening value as well.</p>	<p>USEPA provided additional information to be included in the FS paragraph – that information will be included in Section 5.4.3</p>

**Resolution of USEPA Comment and Army Response  
Draft Final Feasibility Study Dated March 2003  
Jefferson Proving Ground**

	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
	The residential, agricultural and industrial worker scenarios make statements of assumptions such as ...if subsurface soil is assumed to be mixed and dispersed .... or other statements which make a chemical not a COC and so on, instead it is recommended that the exposure assessment for the residential, agricultural and industrial worker scenarios just state what was calculated from actual concentrations for that pathway and receptor and only then give reasons for disagreement.	Comments are not applicable to the FS. Risk Assessment workplans were prepared and approved years ago and the Risk Assessment was summarized in the RI.	After discussion, the team concluded that no additional response is needed.
	Site 3 was used in the mid-1970s for open burning of explosives and other burnable materials. Site 4 includes a landfill that was used from 1941 to 1970 for film refuse from the photographic laboratory and a large variety of other unknown wastes; and a new burn site identified in 1995 during a UXO survey that was apparently used for open burning. Because of the background history at Sites 3 and 4, U.S. EPA recommends that the Army sample the groundwater for perchlorate. Perchlorate was used as a primary oxidizer in solid rocket fuel, in explosives/fireworks and widely used by the Army, Navy, Air Force and the National Aeronautical Space Administration (NASA).	Comment noted, however, no sampling for perchlorate will occur at this time. Current DOD policy pertaining to perchlorate is that unless there is a reasonable basis to suspect both a potential presence of perchlorate and a pathway on [an installation] where it could threaten public health then no perchlorate sampling will be done.	No additional response is needed.
5.	Site 7 - Red Lead Disposal Area and Site 21B - Temporary Storage Area at Building 211: It appears that no samples were taken under the Building 211 concrete slab. If this is correct, U.S. EPA recommends additional sampling be performed under Building 211 in order to appropriately assess the extent of contamination and see if there are any additional comments on the human health risk assessment for the residential and industrial worker scenarios.	No additional sampling will take place – there is no risk associated with soils under the slab. Based on the risk assessment, no soil removal is necessary at these sites. Sampling for Perchlorate will not be performed at this time. Current DOD policy pertaining to perchlorate is that unless there is a reasonable basis to suspect both a potential presence of perchlorate and a pathway on [an installation] where it could threaten public health then no perchlorate sampling will be done.	USEPA visited the site and agreed that no additional sampling or soil removal is necessary at this site. No further response is needed.
	U.S. EPA recommends that the remedial action at Site 21B include soil removal (excavate/disposal) at soil sample location 3B, because the metals aluminum, barium, beryllium and manganese exceeded their U.S. EPA Region 9 residential preliminary remediation goal (PRG). Based on the site history at Sites 7 and 21B.		
	U.S. EPA recommends that the groundwater monitoring wells be sampled for perchlorate. Red lead was used as an oxidizer in pyrotechnics and as an ingredient in some explosives. Perchlorate is associated with pyrotechnics and explosives.	The Army does not agree with the selection of Alternative 3 – Collection and Treatment. Middle Fork Creek is at least 2 miles from the site and should not be impacted by surface storm water in the drainage ditch. Pump and treat of groundwater is not appropriate to address storm water runoff.	USEPA agrees that Alternative 3 is not necessary. No further response is necessary.
	This area is practically devoid of vegetation, surface water collects in a drainage ditch between the railroad tracks and Building 211 and it will eventually drain into Middle Fork Creek (located north of the firing line). With this in mind, U.S. EPA recommends selecting Alternative 3: Collection and Treatment in which toxicity, volume and mobility of contamination would be removed.		
6.	Site 9 - Burning Ground at Gate 19 Landfill and Site 10 - Gate 19 Landfill: In Section 7.4 Summary of Human Health Risk Assessment, since the Burning Ground (Site 9) and Gate 19 Landfill (Site 10) are contiguous, it is recommended that the risk assessment for the residential and industrial worker scenarios be based for the whole area. Section 7.5 Summary of Ecological Risk Assessment, for Site 9, acknowledges a degree of uncertainty and the possibility of risk in the aquatic system because no comparisons to reference area sediments were done. There was no mention of Hazard Quotient (HQ) analysis or toxicity testing for the Site 9 aquatic ecosystem.	Comment is not applicable to the FS. The risk assessment (presented in the Final RI) is not going to be rewritten to make the results more general. Specific evaluations are provided for each area and the applicable results are used in the FS.  Also, refer to response to General Comment 1 in regard to the uncertainty associated with the Site 9 aquatic ecosystem.	No further response is necessary. See previous resolution notes for General Comment #1.

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6. Cont	<p>Sites 9 and 10 have metals, SVOCs, VOCs and PAHs that exceed PRGs in soil and groundwater samples and iron exceeded the PRG in sediment samples. The FS does not reflect the Army’s response (dated September 3, 2002) to U.S. EPA’s comments (dated August 23, 2002) and the agreement that was made at that time. The Army’s September 3, 2002 response stated that “<i>The aquatic ecosystem shows one aquatic receptor that might be sensitive (Blue Herron)..... It is the Army’s opinion that cleaning up to industrial human health numbers for the soil will reduce the impact from surface water run-off from the soil portion of this site to this small pond. During removal actions water samples will be collected from the pond to confirm that the low levels of contaminants within the surface water and sediments of Site 9 have since been reduced by natural processes such as; over growth of thick grasses limiting surface water run-off, lack of site activity reducing the potential of continued contamination, and the natural uptake of metals by plants and attenuation of volatile and explosives.</i>”</p>	<p>Because the planned future land use for these two sites is to incorporate them into the current refuge system, the Industrial land use scenario is not applicable. Instead, the on-site hunters and trespassers scenario most closely represents the human exposure to these sites. A site-wide evaluation for risk to on-site hunters and trespassers was performed and summarized in the RI. Based on that, there are no exposure pathways that would pose a human health concern.</p> <p>The reference to removal actions “During removal actions water samples will be collected ...” is a misunderstanding - the Army stated that a sample would be collected from the pond during soil removal that will be performed as part of RA activities at other JPG sites. It is not the Army’s intention to remove soils at Site 9/10, which are located north of the firing line. In addition, Sites 9/10 (Gate #19 Landfill) is regulated under the IDEM solid waste program and was closed in accordance with an approved IDEM closure plan in 1995.</p>	
	<p>U.S. EPA recommends further sampling for perchlorate and bioaccumulative chemicals (PCBs, dioxins and furans). U.S. EPA also recommends soil removal as stated in the Army’s September 3, 2003 response to comments and limited action (continued groundwater monitoring).</p>	<p>Site investigation activities were concluded with the Final RI. The site is located north of the firing line. No additional sampling will occur for the FS. Sampling for perchlorate will not be performed at this time. Current DOD policy pertaining to perchlorate is that unless there is a reasonable basis to suspect both a potential presence of perchlorate and a pathway on [an installation] where it could threaten public health then no perchlorate sampling will be done.</p>	<p>No further response is needed.</p>
7.	<p>Site 12A - Building 602 Solvent Pit Area: Since the solvent disposal gravel pit, located immediately adjacent to Building 602, consisted of a pit, approximately 3 feet in diameter and 3 feet deep and the excavation of contaminants resulted in a 15 feet by 15 feet area and approximately 12 feet deep it is recommended that additional sampling be performed of the soil under the floor inside Building 602 and especially around the solvent disposal pit area.</p> <p>Without the additional sampling it would be inappropriate to make comments of the extent of contamination, assessment for natural attenuation or even comment on the human health risk assessment for the residential and industrial worker scenarios.</p>	<p>Comment noted but we strongly disagree with the statement. The Army’s position is that the risk assessment was very conservative in nature and no additional sampling is required. Maximum concentrations of contaminants in subsurface soil were used in the vapor intrusion model. In addition, there is no reason to believe that higher concentrations would be detected beneath the building than soils that were collected at the source. In the modeling it was assumed the maximum soil concentration was present below the entire building.</p> <p>The Final RI presents a thorough investigation of the solvent pit and the impacted soil and groundwater. The extent of contamination is sufficiently defined to evaluate remedial alternatives. Adequate data was collected to assess the feasibility for natural attenuation, which was also presented in the Final RI.</p>	<p>A discussion of the vapor intrusion model results form the Final RI was inadvertently not included in the FS for Sites 12A and 12B. That information will be added into the sections involving Sites 12A and 12B. Adding in this discussion was considered adequate to address USEPA’s concern.</p> <p>USEPA agrees with the general FS conclusion (that monitoring and institutional controls is viable for this site). Two additional wells will be installed and included in the monitoring program. The monitoring program (parameters and frequency) will be identified in the RD plan.</p> <p>Also see Meeting Minutes from the July 31 discussion, regarding the RD plan.</p>
8.	<p>Site 12B - Building 617 Solvent Pit Area: Since the solvent disposal gravel pit, located immediately adjacent to Building 617, consisted of a pit, approximately 3 feet in diameter and 3 feet deep and the excavation of contaminants resulted in a 16 feet by 18 feet area and approximately 12 feet deep it is recommended that additional sampling be performed of the soil under the floor inside Building 617 and especially around the solvent disposal pit area.</p> <p>Without the additional sampling it would be inappropriate to make comments of the extent of contamination, assessment for natural attenuation or even comment on the human health risk assessment for the residential and industrial worker scenarios.</p>	<p>See Response to Specific Comment No. 7 above.</p>	<p>The vapor intrusion model discussion was inadvertently not included in the FS and will be added.</p> <p>USEPA agrees with the general FS conclusion. Four additional wells will be installed at Site 21B and included in the monitoring program. The program will be identified in the RD plan.</p> <p>Also see Meeting Minutes from the July 31 discussion regarding the RD plan.</p>

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9.	<p>Site 12C - Building 279 Solvent Pit Area: Since the solvent disposal gravel pit, located immediately adjacent to Building 279, consisted of a pit, approximately 3 feet in diameter and 3 feet deep and the excavation of contaminants resulted in a 10 feet by 10 feet area and approximately 8 feet deep it is recommended that additional sampling be performed of the soil under the floor inside Building 279 and especially around the solvent disposal pit area.</p> <p>Without the additional sampling it would be inappropriate to make comments of the extent of contamination, assessment for natural attenuation or even comment on the human health risk assessment for the residential and industrial worker scenarios.</p>	<p>This comment is not applicable to the FS. Site 12C attained clean closure. Confirmation samples indicated that soils containing contamination above PRGs were successfully removed, therefore there is no risk associated with Site 12C soils. See response to Specific Comment No. 7 above.</p>	<p>Per the meeting notes from the 26 June 03 conference call, USEPA would like to see sampling under the slab at Site 12C. The Army indicated that sampling is not required under the slab because confirmation sampling during removal action indicated that contaminated soils were successfully removed. Sampling under the slab will not be done.</p> <p>It was noted by MWH that site 12C did not have residual contamination after the interim removal action was complete, and so vapor intrusion modeling was not required.</p> <p>At the July 29 meeting, USEPA, IDEM, and RAB representatives agreed with the Army response and no further response is required.</p>
10.	<p>Site 14 - Yellow Sulfur Disposal Area: Upon reviewing the nature and extent of contamination of the site area, the potential for UXO still exists in the area and it is recommended that this problem be resolved before a proper and complete human health risk assessment be performed under the proposed residential and industrial worker scenarios.</p> <p>Long-term monitoring (LTM) of the groundwater should include sampling and analysis for total metals because Phase II groundwater samples indicated that arsenic is present in all 4 wells, lead was present in MW93-24 and cobalt was also present.</p>	<p>UXO is not a risk issue. It is a safety issue, and will be addressed during completion of the soil removal action. A Statement of Clearance for all area within the JPG cantonment or where UXO removal actions were performed has been received. All areas in which UXO removal actions were conducted in which residual soil sampling and analysis was performed to identify potential residual metals/explosives resulted in no detections of metals/explosives that would have presented a risk to human health or the environment.</p> <p>The Army concurs with institutional controls and groundwater monitoring; however the parameters and frequency for LTM will be addressed in the RD Plan.</p>	<p>No additional response is needed.</p>
11.	<p>Sites 21A and 30 - Building 204 Temporary Storage Area: There seem to be no samples taken under the concrete slabs, if this is true, then it is recommended that additional samples be taken under the slabs in order to comment on the extent of contamination and on the human health risk assessment for the residential and industrial worker scenarios. Recommend further subsurface soil and groundwater sampling.</p>	<p>This comment is not applicable to the FS. There is no risk associated with soils under a concrete slab. In addition, there is no reason to believe, based on the nature of the contamination, that contamination would be located below the slab. The Army will not perform additional investigation.</p>	<p>No additional response is needed.</p>



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	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
LDC DATA VALIDATION REPORTS FOR DRAFT FINAL PHASE II RI DATA VALIDATION REPORTS (MWH/LDC) GENERAL COMMENTS			
A.	It is indicated in the text of the QCSR, as well as the detailed data validation reports, that the Louisville Chemical Guidelines (LCG) Version 3.0 was utilized as a primary guidance document for data validation for the Supplementary sampling data effort. U.S. EPA had indicated in previous comments that we considered LCG Versions 1.0 thru 4.0 to be evolving draft-only versions of the LCG. We indicated that Version 5.0 of the LCG should be used to validate this data, as it is the latest version which contains corrections and additions generated from review and comments on the previous draft documents. Army agreed to use LCG 5.0, and it was stated in the teleconference call of July 30, 2002 that the data for the Supplemental effort would be checked/validated using LCG Version 5.0. US-EPA was of the understanding that this validation of the data would be provided in some kind of report, and that any differences that arose between the validation by LCG 5.0, versus the earlier version 3.0, would be described and detailed. To the best of my knowledge, US-EPA has not yet received anything in writing verifying that there was an agreement to validate the data using LCG 5.0, nor any subsequent report of findings from this validation. Will something be provided, and if so, when? <b>ARMY Response: The QCSRs, associated tables, and qualified results data tables have been revised to include the changes between LCG 1, 3, and LCG 5. These will be included with the Final RI. The LCD data will be reviewed to evaluate any differences between LCG 3 and LCG 5. U.S. EPA Response:</b> Concur.	None required.	No additional response is needed.
B.	Sporadic Marginal Failure: It was noted in both the text of the Supplemental effort QCSR, as well as in the MWH Data Verification Reports, that the Sporadic Marginal Failure (SMF) QC limits were utilized, particularly for LCS/LCSD. It appears that these much wider range SMF limits were sometimes used as the default QC limits whenever samples failed to meet the primary QC limits. It is our understanding that Sporadic Marginal Failure is just as it says, both infrequent, and marginally out of spec. In LCG Draft Version 3.0, there was no clear, concise definition of what “sporadic marginal failure” actually was, and this was corrected in LCG Version 5.0. In Version 5.0, “Sporadic Marginal Failure accumulation is allowed up to 5% of the target list for non-contaminants of concern”. It does not say that the SMF QC limits are to be automatically applied as a default to any and all analytes that fail the primary QC limits. Basically, how was the SMF QC criteria applied to the validation of the data for the Supplemental sampling effort? Please elaborate. Also, in the validation of this data using LCG Version 5.0, will the current definition and limitations of SMF, as stated in the above quote, be applied? <b>ARMY Response: The LCS/LCSD data will be reviewed according to Appendix C in LCG 5. Sporadic Marginal Failure (SMF) will not be used for evaluation of LCS/LCSD. U.S. EPA Response:</b> Concur.	None required.	No additional response is needed.

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<b>Data Validation Report Comments</b>			
12.	LDC and MWH Data Validation Reports for Volatiles SDG# 01K231. For QC MRLs, there seems to be a discrepancy between the MWH and LDC reports. MWH indicates some MRL recoveries were out of spec, and the included Comment sheet shows handwritten notes on MRL I and MRL II. The LDC report however, states that for sample JPG-S12BMW01-12, no method reporting limit standard was analyzed, but no flags applied to any data. Please explain. <b>ARMY Response: LDC did not find the associated MRL data to review. MWH qualifiers are correct.</b> <u>U.S. EPA Response:</u> Concur.	None required.	No additional response is needed.
13.	LDC and MWH Dval Reports for Holding Times (see SVOC SDG# 01F118 for example): Text stated that holding time for extraction was exceeded by two days, and no data flagging was applied. Looking at the LCG, the data validation guidelines sections state for holding times (not just for SVOCs, but for other analytical protocols as well, such as VOCs, etc.), that if the hold time is exceeded, data is flagged “J” for detects, and “UJ” for non-detects. Please explain. <b>ARMY Response: It is a judgement call as to whether it was a gross holding time exceedance. In this case, a holding time exceedance of 1 or two days is not a gross exceedance. However, the J/UL qualifiers will be added to the data.</b> <u>U.S. EPA Response:</u> Understood. Data to be flagged J/UJ.	None required.	No additional response is needed.
14.	<u>Appendix D8 of the Construction Completion Report for Sites 12A, 12B, 12C and 33:</u> EPA saw only metals data sheets in Appendix 4 in the Construction Completion Report for Sites 12A, 12B, 12C and 33. Proper documentation for QA/QC at Site 33 is still required for the Army to propose <i>no further action (NFA)</i> . Please see U.S. EPA’s original comment regarding this issue:  <i>“Appendix D8 in the Construction Completion report contained the Quality Control Summary Report (QCSR). The QCSR states that it is a combination of the Laboratory Data Consultants validation and the Montgomery Watson reviews. However, the QCSR contains no “E” data qualifier. In addition, there is no discussion regarding this data qualifier’s frequency of use or impact on data quality. Revise the QCSR to provide more information on the use of the “E” qualifier and the impact on the qualified data for the project.”</i>  <i>“This Appendix contains summaries of all data collected for the project. However, there appears to be no summary table for the dioxin/furan results. Revise the CCR to provide a dioxin/furan summary table. This table should also include the data for the background samples for the project”.</i>	<p>This comment is not applicable to the FS. Please refer to our previous February 14, 2002 response to this EPA comment (in the Final CCR Appendix H). Also please note the subsequent EPA comment saying no further response is necessary (April 29, 2002, Final CCR Appendix H).</p> <p>This comment is not applicable to the FS. Please refer to our previous responses dated February 14, 2002 and April 29, 2002 (CCR Appendix H) that state the location of the dioxin result table.</p>	<p>At the meeting, USEPA indicated that Table 5 of the CCR did not contain the information sought. Appendix D8 of the CCR, containing the QCSR, contains summary tables with both laboratory and data validation qualifiers for all analyses except dioxins. USEPA requests that a table of dioxin results be submitted that includes results of the individual dioxin congeners, the total dioxin results, and laboratory and validation qualifiers applied to the samples.</p> <p>MWH will provide this information as an amendment to the CCR.</p>
<b>FINAL PHASE II RI DATA QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) GENERAL COMMENTS:</b>			
	As per U.S. EPA’s request, data validation reports from MWH and LDC for the Supplemental Sampling Effort were revalidated utilizing Version 5.0 of the Louisville Chemical Guidelines. Text was added to explain any differences in findings between the previous validation, and the validation utilizing LCG Version 5.0. Validation checklists and reports with notations for any changes due to validation using LCG 5.0 were included in the Final RI Report.		

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	Comment (29 April 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting or from the 26 June 03 Conference Call
<b>There are several additional questions as per the Final RI Report:</b>			
	<p>Volume VII, Appendix P, MWH QCSR for Supplemental Groundwater Monitoring and Surface Water and Sediment Sampling (June 2001): It was noted in Section 3.3 Surface Water Samples for VOCs that up to 30 compounds failed to meet the minimum MRL CCV limits, and were flagged as “R” rejected. Section 3.6 Summary of Completeness states that surface water VOCs had only a 62% level of completeness, yet the text states that the unusable compounds in the VOC data “have no negative impact on the project”. Review of Table 5 Summary of Unusable Data, lists a wide range of compounds such as (but not limited to, for example) benzene, vinyl chloride, xylene, toluene, and 1,1,1-Trichloroethane as being rejected non-detects. They are flagged “R” due to being “qualified as negatively biased due to calibration nonconformances”. The low level of completeness for a range of potential contaminants of concern raises the issue of a data gap that may need to be addressed further. <u>Please explain.</u></p>	<p>The Army agrees that many VOCs are qualified unusable, however the ketone compounds (acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone) are typically difficult to recover, due to the chemical properties. Because VOCs were not detected in associated sediment samples, it is not likely that they would be detected in surface water samples.</p>	<p>During the July 29 meeting, USEPA indicated that their concerns are about the compounds listed above in USEPA original comment, not just the ketones in the Army response. Although VOCs were not noted in the sediment samples, it does not necessarily follow that the surface water contains no VOCs. There still may be a data gap, depending upon the data requirements for this project.</p> <p>The Army’s previous response was discussed: because VOCs were not detected in associated sediment samples, it is not likely that they would be detected in surface water samples.</p> <p>The Army, USEPA, and IDEM agree that the response is satisfactory and no additional information is needed.</p>
	<p>Volume XI, Appendix GG MWH Data Verification Reports: It was noted for numerous groundwater VOC SDGs, the Sample Receipt Form lists multiple entries as discrepancies. Those discrepancies are multiple sample vials with bubbles in them. Such entries noted repeatedly were “all vials w/large bubbles”, or with specific vials with large bubbles, vials with small bubbles, broken vials, etc. Trip blanks were sent with headspace. Vials were missing the date/time on the label. The analysis was not written the label for a number of the vials. For some SDGs, it appears most, if not all sample vials had bubbles, some with all large bubbles. The problem appears to have occurred throughout the June 2001 sampling round, and appeared also in the November 2001 round. The only notation seen in corrective actions was to “use vials w/o bubbles”. How was this situation dealt with? Were vials with bubbles not to be used for VOC analysis? Was there any field corrective action taken to lessen the occurrence of these problems? <u>Please explain.</u></p>	<p>In all cases the vials without bubbles were used for analysis. The samplers always collect samples without headspace. However, due to the nature of site groundwater the preservative (HCL) may react with water constituents (calcium carbonate) to create small air bubbles. Short of adding no preservative to the VOC samples there is little the samplers can do to prevent this in the future.</p>	<p>As discussed in the 26 June 03 conference call and recorded in the meeting notes, USEPA asked if the Army means that only those bottles without bubbles were tested. As indicated in the May 22 response to this comment, in all cases the vials without bubbles were used for analysis. Dr. Mansy (USACE) also responded that there are many variables that affect the samples after being taken that may cause bubbles. It is difficult to avoid with VOC samples preserved in HCL. Other factors that have an effect may include cooling, allowing samples to get back to room temperature (in the laboratory), shaking that occurs in transit, etc.</p> <p>USEPA additional comment during the July 29 meeting: USEPA asked how it is possible that “in all cases the vials without bubbles were used for analysis” when some of the lab sample receipt forms stated that all the vials in the shipment had bubbles. It is understood that aqueous VOC samples were sent in and are apparently deemed acceptable by Army if they are received by the lab with headspace, missing date/time information, and having some SDGs allowed to have “all vials with large bubbles”. USEPA will take this army practice into consideration when evaluating the usability of aqueous VOC data for decision-making purposes.</p> <p>The Army’s previous response was noted – those vials without bubbles were used in the analysis. Not all vials had bubbles. After discussion, it was agreed that this was probably a communication problem, but steps should be taken to have better communication with the lab in the future. The laboratory will fax or call immediately when problems with samples are noted (as is the current practice).</p>

**A2**

**IDEM**

**Resolution of IDEM Comment and Army Response**  
**Draft - Final Feasibility Study Dated March 2003**  
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	Comment (30 May 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting and 19 June Conference Call
1.	Under the baseline risk assessment process discussion, the text indicates the use of air dispersion models to predict concentrations of analytes in air. Please identify the specific air dispersion models used and their strengths and weaknesses.	The air dispersion model used was the USEPA-approved Industrial Source Complex Short Term 3 (ISCST3) air dispersion model, version dated May 7, 1996. The model was performed using all regulatory default dispersion options and rural dispersion coefficients. A summary of the model and the results are in Appendix R of the Final Remedial Investigation Report, September 2002.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
2.	On Page 1-6, under the bullet for Remedial Action Object (RAO) for protection of ecological receptors, the underlying object is confusing and poorly written. IDEM staff believe that the intent of the objective is to state that ecological protection will be achieved through preventing ingestion of, inhalation of, or direct contact with Contaminants of Concern (COCs).	Concur. Text will be revised to clarify.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
3.	For sites with institutional controls on the groundwater, the groundwater must be analyzed for chemicals of concern (COCs) and monitored natural attenuation (MNA) parameters. Groundwater samples should be collected quarterly to account for seasonal variations. The levels of contamination and trending of MNA parameters will determine the groundwater monitoring duration. Also, wells must be placed such that it is able to be determined that contamination has not extended off-site.	The location of new monitoring wells will be determined in the field with the concurrence of an IDEM representative. The sampling program, including parameters and frequency, for each site will be outlined in the Proposed Plan and subsequent documents prior to initiation of the RA activities. This will be further discussed in the Face-to-Face meeting between the Army, USACE, EPA, and IDEM.	As discussed during the June conference call, MWH prepared (submitted to the team on 01 July 2003) a memorandum giving proposed locations for the new wells and the rationale behind those locations. Drawings showing IDEM-suggested locations and Army/MWH proposed locations accompanied that memo.  Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting. A site visit was made to the sites where new wells will be installed. Locations for the wells were agreed by USEPA and IDEM and were flagged in the field. It was agreed that the sampling program will be detailed in the RD plan and that sampling frequency and duration would be performance based.
4.	For Site 1 (Building 185 Incinerator), the consultants are recommending no further action (NFA). However, the cancer risk exceeds the U.S. Environmental Protection Agency's (USEPA's) target risk range. It was recommended that 2,3,7,8-TCDD (tetrachlorodibenzo- <i>p</i> -dioxin) be excluded from the calculation and consider this contamination unrelated to site activities. Further explanations and justification that excluding 2,3,7,8-TCDD is not putting potential residents at risk is needed before NFA is acceptable.	As stated in the FS, dioxin concentrations in the soil at Site 1 are comparable to background concentrations, which are unrelated to previous Site 1 activities. Based on the background sampling, dioxin is ubiquitous in soils in the region, and not related solely to activities at Site 1. Besides being an impractical action, the removal of dioxin contaminated soil at Site 1 will not appreciably change the potential risk for residents in this area or elsewhere in the region. This site will contain deed restriction for residential use. It is intended for industrial use only and deed restriction will be included in any deed transfer documents and recorded at the courthouse.	Per meeting notes from the 19 June 03 conference call, response is satisfactory. Also refer to Appendix B3 for additional comment on Site 1 dioxins.
5.	For Site 1 (Building 185 Incinerator), in Section 3.3.1, the text states that the metals contaminants detected are consistent with those present in the soils associated with the sewage sludge disposal areas adjacent to the incinerator. This statement suggests that contaminant migration from an adjacent area may be possible. This possibility has been omitted from the text. IDEM staff believe that discussion should be present that either eliminates, minimizes, or supports this possibility.	The sewage sludge disposal area is adjacent to the incinerator, and soils at both sites have concentrations of contaminants that are similar to background soils. The intent of the statement was to indicate the broad presence of these contaminants related to their presence in the background soils. The intent was not to suggest potential contaminant migration from the adjacent site. The text in Section 3.3.1 will be modified to clarify this point and state that contaminants detected are consistent with those found in the background soils.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
6.	For Site 1 (Building 185 Incinerator), in Section 3.3.2, the text suggests that the precipitation would infiltrate rather than runoff to the nearest surface-water. IDEM staff disagree with this statement given that the majority of the JPG site surface soils contain a high percentage of clay with very low permeability. During lengthy or heavy rain events, it is highly likely that runoff would occur, particularly if the soils have been cultivated.	We agree with the IDEM staff assessment that the majority of site surficial soils contain a high percentage of clay resulting in a relatively low bulk permeability. These soil conditions are expected based on the glacial parent material from which these soils are derived. Indeed, much of the glacial till (Wisconsin Loess and Illinoian Till) have a predominance of fine-grained material that is characterized by its overall low permeability.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.

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	Comment (30 May 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting and 19 June Conference Call
6. Cont.		<p>With regard to the comment that runoff is likely to occur during a heavy or lengthy rain event, we generally concur but with several clarifications. Site 1 is located over 1.5 miles from the nearest surface water, Harberts Creek, with no direct drainage to the creek. Thus, runoff from a storm event would need to travel via overland flow to the creek. The land between the creek and the site consists of mostly flat, gently undulating tilled fields or grassy mowed areas with a small wooded area that gently slopes from the tilled fields to the creek. Because the tilled field is essentially flat, surface water velocities of overland flow would be low, which would give time for greater infiltration and importantly would impede sediment transport. In addition, low spots in the undulating field are likely to further capture or retard overland flow. Because of these impediments to sediment transport and recalling the affinity of metals to fine-grained soils, the potential for migration is greatly limited.</p> <p>While the potential for gully washing may increase in tilled fields that have moderate slopes or swales, farmers practicing proper soil conservation techniques will cultivate fields to promote infiltration and reduce runoff. Depending on the season, the soil conditions, and vegetation (i.e, crops), field capacity during a precipitation event will vary and directly impact whether precipitation infiltrates into the ground or runs off via overland flow. In general, we believe that precipitation falling to the ground at the site will infiltrate the ground or run off towards Harberts Creek via overland flow. Because of the ground surface conditions between the site and the creek, we believe that most overland flow will be impeded or retarded sufficiently that this water will also likely infiltrate into the ground before reaching the creek.</p> <p>The text will be modified to clarify these points.</p>	
7.	For Site 1 (Building 185 Incinerator), in Section 3.4.3.1, the text indicates that the Hazard Indices (HIs) for Site 1 for future on-site adult and child residents both exceed the USEPA’s risk management criterion of 1.0. IDEM staff wonder how a NFA remedy can be suggested or selected for this site.	<p>The risk associated with Site 1 is from inhalation of dust from wind erosion from agricultural fields and the primary COCs are manganese and dioxins. The pathway was evaluated assuming dust is generated 252 days per year and the receptors would inhale the maximum amount on all 252 days. The site is currently well vegetated and will not likely generate dust due to wind erosion.</p> <p>In addition, dioxin concentrations in the soil at Site 1 are comparable to background concentrations (See Response to Comment #4). Dioxin is ubiquitous on surface soils in the region. Therefore, removal of surface soils is impractical and would not appreciably change the potential risk for residents in this area or elsewhere in the region.</p> <p>Also, note that the maximum concentration of manganese is well below the current USEPA Region 9 PRG.</p>	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
8.	For Site 1 (Building 185 Incinerator), in Section 3.6.1, the text suggests the inhalation exposure pathway is unlikely applicable to this site due to the use of overly conservative input parameters in the risk assessment. Though this assertion may be warranted and applicable, no information is presented to support this assertion. IDEM staff suggest that risk management numbers be generated using parameters that match their assertion.	Please review Section 3.4.1.2 in the FS for information describing and supporting the conservative nature of the risk calculations. Additional text will be included in Section 3.6.1 to clarify that the pathway is incomplete due to the site being well vegetated.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
9.	For Site 2 (Sewage Treatment Plant) and Site 27 (Sludge Application Area), in Section 4.3.2, the text in the third paragraph indicates “elevated” levels of some metals contaminants, however, there is no indication whether these levels exceed a standard or background concentrations.	The metal concentrations in surface water were below PRGs as indicated in Table 4-5. A statement will be added to the text to clarify.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.

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10.	For Site 2 (Sewage Treatment Plant) and Site 27 (Sludge Application Area), in Sections 4.4.1.1 & 4.4.1.2, within the bulleted items, lead (Pb) has been omitted as a contaminant of potential concern (COPC) for surface soils and surface/subsurface soils combined. In Section 4.3.2, the third sentence of the first paragraph states that lead and silver are COPCs. A correction is advised.	Concur. Lead will be removed from the sentence in Section 4.3.2.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
11.	For Site 2 (Sewage Treatment Plant) and Site 27 (Sludge Application Area), in Section 4.6.1.2, the text indicates that the industrial scenario was not assessed for Site 27 based on the assessment for this scenario for Site 2. IDEM staff believe that this determination is being made based on the similarities in COPCs and other risk factors to Site 2. Additional language must be presented that identifies or states how this determination was reached.	Additional text will be included in Section 4.6.1.2 to clarify.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
12.	For Site 2 (Sewage Treatment Plant) and Site 27 (Sludge Application Area), in Section 4.6.1.3, the text indicates that there is no exposure threat for hunters to water or sediments in Harbert's Creek. Please present the numbers from the risk assessment to support this claim.	The hunter scenario was evaluated in Section 28 of the Final RI as a facility-wide scenario. The calculated HI is 0.02 and the calculated cancer risk is $1.3 \times 10^{-06}$ , indicating that exposure of hunters to Harberts Creek does not pose a human health concern. Text will be added in Section 4.6.1.3 to clarify.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
13.	Site 2 (Sewage Treatment Plant) and Site 27 (Sludge Application Area) are being recommended for no further action (NFA) based on Industrial Use restrictions. However, the overall hazard indices (HIs) for on-site workers (2.3) exceeds the risk criteria of 1.0. The critical pathway of exposure is inhalation of fugitive dusts. Aluminum, manganese, and silver are the chemicals of concern for this pathway. Justification on how future workers are not at risk is required before NFA status can be considered.	Further explanation concerning the HI of 2.3 will be provided in Section 4.6.1 of the Final FS to justify the conclusion. Within Section 4.4.1.3, we explain that the dust exposure pathway, which is the basis of the HI of 2.3, should not be a concern due to the overly conservative nature of the risk calculations. The risk assessment was performed assuming bare ground with no vegetation, however this site is heavily vegetated. This will be clarified in Section 4.6.1 as well.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
14.	For Site 3 (Explosive Burn Area), Site 4 (Abandoned Landfill), and New Burn Site, the text indicates that contaminated soils will be excavated and disposed, which would allow unrestricted access to the property. Confirmatory samples must be collected to ensure all contamination has been removed and appropriate QA/QC documentation must be submitted. Any unexploded ordnance (UXO) encountered must be addressed.	All soil removal activities will be done according to an approved work plan (submitted and approved prior to work). The work plan will describe the confirmation sampling to be performed and all data will have the proper quality control. The soil removal action will include UXO support.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
15.	For Site 7 (Red Lead Disposal Area), in Section 6.2.1.1, on page 6-2, the text in the first paragraph indicates that additional soils was removed using hand shovels rather than a backhoe. It is unclear whether additional confirmation soil samples were collected after the additional shoveled soils were removed. Additional text is needed to clarify the actual performance and results of this task.	Additional confirmation samples were not necessary because of the sufficient number of compliant samples surrounding these 2 locations. This statement will be added to Section 6.2.1.1.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
16.	For Site 7 (Red Lead Disposal Area) and Site 21B (Temporary Storage Area at Building 211), in Section 6.4.3.1 Future On-Site Workers, the overall HI is 1.4, which exceeds the risk management criterion. The text indicates that the HI was rounded to one significant digit. This practice is unacceptable for calculating risk exposures. A correction must be performed.	The calculated HI was not rounded. The text simply states that if the calculated HI (1.4) is rounded, it does not exceed 1.0. No new calculation is needed. Please note that this site has been evaluated for arsenic in groundwater.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
17.	For Site 7 (Red Lead Disposal Area) and Site 21B (Temporary Storage Area at Building 211) have been designated for Industrial Use. The sites would have institutional controls restricting access to the groundwater. This is acceptable, however please see comment 3 regarding groundwater monitoring.	Comment noted.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.

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18.	For Site 7 (Red Lead Disposal Area) and Site 21B (Temporary Storage Area at Building 211), in Section 6.8.2, the text indicates that groundwater monitoring be for a period of 10 years. Groundwater monitoring should occur until COCs have been detected below the established health-based standard (i.e., PRG) for a minimum of four consecutive quarters.	Comment noted. The monitoring program will be discussed at the face-to-face meeting and will be outlined in the Proposed Plan.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.  Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting.
19.	For Site 9 (Burning Ground at Gate 19 Landfill) and Site 10 (Gate 19 Landfill), in Section 7.2.4, on page 7-3, the text in the first sentence indicates that 1,2,5-trinitrobenzene is an explosive. On page 7-4, the text indicates that the results from Phase II sampling detected no explosives and also indicates that presence of 1,2,5-trinitrobenzene at concentrations that exceed USEPA Region 9 PRGs. A correction is warranted.	The PRG exceedances for manganese and 1,3,5-trinitrobenzene were detected in the Phase I samples. No explosives were detected in the Phase II sample. The text will be revised to clarify.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
20.	For Site 9 (Burning Ground at Gate 19 Landfill) and Site 10 (Gate 19 Landfill), in Section 7.4.1.3, on page 7-7, the text indicates that air emission/dispersion modeling was used. Please identify the modeling that was used to support your conclusions.	Refer to the response to Comment #1.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
21.	For Site 9 (Burning Ground at Gate 19 Landfill) and Site 10 (Gate 19 Landfill), the intended use is wildlife refuge. The Army will not transfer the property out of its ownership. The recommended NFA, restricted use is acceptable. However, if the land use changes then the soil and groundwater contamination must be addressed. Restricted access controls must be maintained.	Comment noted.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
22.	For Site 12A (Building 602 Solvent Pit), the intended land use has been identified as industrial. Institutional controls on groundwater are required. This is acceptable, however the comment 3 above regarding groundwater monitoring must be addressed.	Comment noted.	As discussed during the June conference call, MWH prepared (submitted 01 July 2003) a memorandum giving proposed locations for the new wells and the rationale behind those locations. Drawings showing IDEM-suggested locations and Army/MWH proposed locations accompanied that memo.  Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting. A site visit was made to the sites where new wells will be installed. Locations for the wells were agreed by USEPA and IDEM and were flagged in the field. It was agreed that the sampling program will be detailed in the RD plan and that sampling frequency and duration would be performance based.
23.	For Site 12A (Building 602 Solvent Pit), soil contamination was removed up to the building foundation. Contaminated soil was left in place under the building foundation. If the building is ever demolished in the future the soil must be investigated and properly addressed.	Comment noted.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
24.	For Site 12B (Building 617 Solvent Pit), in Section 9.2.1.2, IDEM staff believe that the text incorrectly references “Building 602” instead of Building 617. This reference must be corrected.	Text will be revised accordingly.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.



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25.	For Site 12B (Building 617 Solvent Pit), the intended land use has been identified as industrial. Institutional controls would be implemented on the groundwater. This is acceptable, however, comment 3 above regarding groundwater monitoring must be addressed.	Comment noted.	<p>As discussed during the June conference call, MWH prepared (submitted 01 July 2003) a memorandum giving proposed locations for the new wells and the rationale behind those locations. Drawings showing IDEM-suggested locations and Army/MWH proposed locations accompanied that memo.</p> <p>Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting. A site visit was made to the sites where new wells will be installed. Locations for the wells were agreed by USEPA and IDEM and were flagged in the field. It was agreed that the sampling program will be detailed in the RD plan and that sampling frequency and duration would be performance based.</p>
26.	For Site 12B (Building 617 Solvent Pit), soil contamination was removed up to the building. Contaminated soil was left in place under the building foundation. If the building is ever demolished in the future the soil must be investigated and properly addressed.	Comment noted.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
27.	For Site 12C (Building 279 Solvent Pit), the intended land use has been identified as industrial. Institutional controls would be implemented on the groundwater. This is acceptable, however, comment 3 above regarding groundwater monitoring must be addressed.	Comment noted.	<p>As discussed during the June conference call, MWH prepared (submitted 01 July 2003) a memorandum giving proposed locations for the new wells and the rationale behind those locations. Drawings showing IDEM-suggested locations and Army/MWH proposed locations accompanied that memo.</p> <p>Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting. A site visit was made to the sites where new wells will be installed. Locations for the wells were agreed by USEPA and IDEM and were flagged in the field. It was agreed that the sampling program will be detailed in the RD plan and that sampling frequency and duration would be performance based.</p>
28.	Regarding the Remedial Action Objectives for sites 12A, 12B, and 12C, IDEM staff have indicated in previous correspondences that permanent monitoring wells must be installed to monitor contamination that may be above the Illinoian till. These wells were not mentioned in the objective. They must be installed and included in any future groundwater monitoring program.	<p>The replacement well locations will be addressed in the Proposed Plan and subsequent documents. The potential locations for new monitoring wells at Sites 12A and 12B will be determined in the field with the concurrence of an IDEM representative. The sampling program, including parameters and frequency, for each site will be outlined in the Proposed Plan and subsequent documents prior to initiation of the RA activities. This will be further discussed in the Face-to-Face meeting between the Army, USACE, EPA, and IDEM.</p> <p>No replacement wells will be proposed for Site 12C. Contaminated soils above PRGs at Site 12C have been removed, and the remaining contaminated groundwater plume exists only in the well (MW88-15) at the former solvent pit. The VOC concentrations in well MW88-15 have decreased significantly following completion of the source removal actions in July 2000. The other seven monitoring wells, five of which are screened in the much more permeable till/bedrock interface, do not have detectable concentrations of contaminants. Lastly, three of the eight monitoring wells (MW88-14, MW88-15, and MW88-16) at Site 12C are already screened within the glacial till.</p>	<p>As discussed during the June conference call, MWH prepared (submitted 01 July 2003) a memorandum giving proposed locations for the new wells and the rationale behind those locations. Drawings showing IDEM-suggested locations and Army/MWH proposed locations accompanied that memo.</p> <p>Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting. A site visit was made to the sites where new wells will be installed. Locations for the wells were agreed by USEPA and IDEM and were flagged in the field. It was agreed that the sampling program will be detailed in the RD plan and that sampling frequency and duration would be performance based.</p>

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29.	Limited action is planned for several sites, which includes institutional controls and a monitoring program. Historically, groundwater has never been monitored on a continuous, regular frequency that would allow for adequate interpretation or trend analysis. Groundwater monitoring is proposed to occur semi-annually in the FS. IDEM staff believe that initially a more frequent monitoring interval should be utilized. A Quarterly monitoring frequency would account for seasonal groundwater fluctuations and potentially provide for trend analysis. Quarterly monitoring could be conducted for the initial two-year span. The data collected could be analyzed and interpreted and result in justification to reduce the sampling frequency to semi-annual sampling. Quarterly monitoring must occur for the wells that will be installed at sites 12A, 12B, and 12C in order to monitor the contaminant levels with respect to the seasonal changes. The text indicates in the remedial alternatives that groundwater monitoring will continue for a period of 10 years. Groundwater monitoring must continue until remediation goals are achieved.	Comment noted and further discussion can occur at the July Face-to-Face meeting. The monitoring plan will be detailed in the Proposed Plan and all subsequent documents. See previous response.	Refer to the Meeting Minutes from the 31 July 2003 face-to-face meeting.
30.	For Site 14 (Yellow Sulfur Disposal Area), IDEM staff believe that the full extent of contamination has yet to be defined. Further investigation of all media seems warranted.	<p>As indicated in the FS, soil removal will continue at Site 14 until confirmation soil sampling indicates that the remaining soils meet USEPA Region 9 residential PRGs for chromium. UXO support will be provided during that effort. Therefore, the extent of soil contamination will be defined through execution of the removal action.</p> <p>During the Phase I RI, three groundwater monitoring wells were installed and sampled. During review of the Phase II RI, the agencies requested one additional downgradient well. One new well was installed and four rounds of sampling were performed at all four wells. The contaminant of concern in groundwater is arsenic that may be a naturally occurring constituent in the region. Additional groundwater investigation for arsenic at this site is not warranted. Sufficient information is available to proceed with remedial alternatives for the apparent groundwater contamination. All of the data is detailed in the Final RI and summarized in the FS.</p>	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
31.	For Site 14 (Yellow Sulfur Disposal Area), the selected remedy includes institutional controls that would be implemented on the groundwater. This is acceptable provided the UXOs are addressed and comment 3 regarding groundwater monitoring is addressed. Removal of metals and low pH contaminated soils is acceptable, considering it being omitted from consideration as an exposure source.	The soil removal action will include UXO support. The groundwater monitoring program will be defined in the Proposed Plan and in all subsequent documents prior to initiating the RA.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
32.	For Site 14 (Yellow Sulfur Disposal Area), it appears that potential UXOs still exist outside the open excavation in the shallow subsurface (within 2-ft of the surface). Additional UXO screening and removal is necessary before the land may be used for agricultural purposes.	UXO support will be given during soil removal activities.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.
33.	Several sites have soil excavations planned. UXO were encountered at site 14. UXO may be present at this site outside of the excavation area. It is unlikely that all of the UXO at this site will be located. Therefore, restrictions must be placed on the future land use with regards to the possible presence of UXO. If UXO are encountered at any of the other excavations, the same restrictions must apply to that land.	UXO support will be given at the excavation sites. The Army has addressed UXO under separate contract and has received "Statement of Clearance" for the Sites south of the firing line.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.

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	Comment (30 May 03)	Army Response (22 May 03)	Resolution From 29 July 03 Meeting and 19 June Conference Call
34.	For Site 21A and 30 (Building 204 Temporary Storage Area), the intended use is for industrial purposes. The consultants have proposed excavation and disposal of contaminated soils, which would result in risk management values being reduced for acceptable residential use. This remedial approach is acceptable, however, confirmatory samples with the appropriate QA/QC documentation is required.	All soil removal activities will be done according to an approved work plan (submitted and approved prior to work). The work plan will describe the confirmation sampling to be performed and all data will have the proper quality control.	Per meeting notes from the 19 June 03 conference call, response is satisfactory.

**A3**

**RAB**

**Response to RAB May 30, 2003 Review Comments**  
Draft Final Feasibility Study for Jefferson Proving Ground  
Madison, Indiana, March 2003

The following are the RAB comments on the *Draft Final Feasibility Study for Jefferson Proving Ground, Madison Indiana, March 2003*, (FS). The comments reflect remaining concerns that they have regarding the recommendations and conclusions that were in the *Phase II Remedial Investigation* report from September 2002. RAB comments are below with the Army's responses following each comment.

**Overall Concerns**

1. As we have stated in numerous response documents, the way in which reference comparisons were done is inappropriate for determining site-specific risks. Reference samples at JPG were taken from within the boundaries of JPG. Given the long history of solvent dumping, open burning and on-site explosions, it is highly likely that all of JPG, as well as part of the countryside around JPG, has been contaminated by the JPG site activities. It is likely that no place on JPG is appropriate as a reference site for comparison to any JPG site. Reference sites, when used, are supposed to be clean, or if contaminated, not contaminated by any chemical similar to those under concern. EPA guidelines, texts, and ASTM (American Society for Testing and Materials) standards recommend that sites may be chosen away from the sites under evaluation if this is needed to avoid contamination leached or drifted from the sites of concern. EPA's *Risk Assessment Guidance for Superfund* (RAGS) requires that "Background samples collected during the site investigation should not be used if they were obtained from areas influenced or potentially influenced by the site." RAGS further states that "naturally occurring levels are levels of chemicals that are present under ambient conditions and that have not been increased by anthropogenic [man-made] sources." For inorganic chemicals such as metals, RAGS states that background concentrations may present a significant risk and an important site characteristic. RAGS suggests considering the risk posed by naturally occurring background chemicals separately. The presence of organic chemicals in background samples, however (dioxins, pesticides, VOCs, SVOCs), indicates that the sample was collected in an area influenced by the site contamination and does not qualify as a true background sample. RAGS suggests that such samples be included with other site samples in the risk assessment. Finally, RAGS states that "Omitting anthropogenic background chemicals from the risk assessment could result in the loss of important information for those potentially exposed."

Further, information on the levels of naturally occurring background chemicals in Indiana is flawed. The samples used to establish the levels of naturally occurring background chemicals in Indiana were collected from known contaminated sites. Therefore, any comparisons to Indiana "background" levels will underestimate the risks to potentially exposed populations. For example, if background levels of chemical J are 40 parts per million and the level of chemical J in a site sample is 40

parts per million, it would then be assumed that the level of chemical J due to activities at JPG is 0 parts per million. In a risk assessment, it would be assumed that future receptors would face no risk from exposure to chemical J. This does not sufficiently protect future human or ecological receptors.

**Response:** As indicated to you in numerous previous responses to this comment, the background sampling was planned with USEPA and IDEM input and USEPA and IDEM concurred with the background locations. The background locations were selected to avoid the influences of activities that occurred at the installation that could potentially cause environmental contamination. For many large installations, such as JPG, the size of the installation is large enough that background locations can be reasonably located outside of the influences of site activities that could potentially lead to environmental contamination. Within the JPG RI, comparisons to background were used to evaluate which inorganic analytes would be carried forward for further risk characterization. This is due to the fact that inorganic analytes are present in the environment naturally, and evaluating risks at background inorganic analyte concentrations for an area is not required under RAGS. It should be noted that comparisons to background were not used to eliminate organic analytes from further consideration in the risk assessment.

This was further discussed in the July 30 2002 Face-to-Face meeting. As discussed in the meeting, the Army notes the concern regarding background locations and agrees to disagree. RAB representative requested that the screen for COPCs not be performed but that risk be calculated using all constituents. The Army replied that they will not be held to a different, higher, standard and therefore will not change their method for risk calculation.

**Refer to the discussions below for each site (in response to specific comments) for the alternative chosen to protect potential human and ecological receptors.**

2. Due to the concerns expressed above, we have concerns about determining that No Further Action is an appropriate course of action for Sites 1 (Building 185 Incinerator), 2 (Sewage Treatment Plant), 27 (Sewage Sludge Application Area), 9 (Burning Ground South of Gate 19 Landfill), and 10 (Gate 19 Landfill). While we concur with MWH that Sites 9 and 10 do not need to move forward to the feasibility study, we disagree that Sites 1, 2, and 27 should not. Site 1 contains dioxin, which is a highly toxic chemical, especially to developing receptors (i.e., infants and children), and can affect many parts of an organism. Sites 2 and 27 contain high levels of metals, two of which are known to affect the nervous system and cause behavioral problems in exposed receptors.

**Response:** The FS evaluation determined that no further action is required under the intended future land use for Sites 1, 2/27, and 9/10. Refer to responses

**to specific comments (below) for additional information regarding each of these sites.**

3. While we agree with the recommendations for removing contaminated soils from Sites 3 (Explosive Burn Area), 4 (Abandoned Landfill/New Burn Site) 21A (Temporary Storage Area – Bldg. 204), and 30 (Adjacent Shed), we do not agree that they are ready for No Further Action until confirmatory samples reveal that chemicals are at acceptable levels.

**Response: This is understood. It is the Army's intent to remove soils until satisfactory confirmation sampling is achieved.**

### **Site-Specific Concerns**

#### Site 1 – Building 185 Incinerator

*COPCs:* COPCs included aluminum, arsenic, beryllium, chromium, manganese, silver, and dioxins.

*HI:* The HI for a future on-site adult resident was 3.1 and for a future on-site child resident was 12.0. These values were from the inhalation of dusts containing *manganese*, for both adults and children, and from the inhalation of dusts containing *aluminum* and *silver*, for children. No other pathways had HI values that were greater than one.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $1.1 \times 10^{-4}$ . This value was from the ingestion of a dioxin (2,3,7,8-tetrachlorodibenzo-*p*-dioxin) in beef raised on the site.

*Ecological Concerns:* Silver was the COC for ecological receptors. This was considered insignificant because the site is small (0.01 acres) and disturbed by agriculture and had only one COC.

*MWH Recommendations:* MWH recommended that no further remediation activities take place at Site 1 and that any type of future reuse could be allowed. MWH made this recommendation based on three main assumptions.

- A) If Site 1 was covered with grass and pavement in a residential situation, exposure to the COCs would be low.
- B) The dioxin on the site did not come from activities performed at Site 1.
- C) No exposure pathways were complete, which justifies No Further Action on Site 1.

*Henshel EnviroComm Recommendations:* We recommend carrying Site 1 through to the feasibility study and have three main concerns with the recommendations made by MWH for Site 1.

- A) MWH assumed that a residential reuse situation would cover most of Site 1 with grassy lawns and pavement, therefore reducing dust at the site. They assume that this reduction in dust would reduce human exposure to manganese, aluminum, and silver, however, they did not determine a HI for such a situation. The HIs for exposure to manganese, aluminum, and silver were 3.1 and 12 times higher than an acceptable HI. We disagree with the assumption that because the site is or could be well vegetated, that the site “would not be expected to generate dust due to wind erosion,” (page 3-6, lines 12 and 13) and make this exposure pathway “unlikely applicable to this site” (page 3-6, lines 13 and 14).

**Response: The risk associated with Site 1 is from inhalation of dust from wind erosion from agricultural fields and the primary COCs are manganese and dioxins. The pathway was evaluated assuming, very conservatively, that dust was generated 252 days per year and the receptors would inhale the maximum dust concentration on all 252 days. The site is currently well vegetated and will not likely generate dust due to wind erosion. In addition, dioxin concentrations are at levels that are comparable to background levels. Dioxin is ubiquitous in soils in the region, therefore removal of dioxin-contaminated soils is impractical and would not appreciably change the potential risk for residents in this area or elsewhere in the region. Also, note that the other COC, manganese, occurred at a maximum concentration that is well below the current USEPA Region 9 full residential PRG.**

**[Please refer to dioxin response dated August 25, 2003]**

- B) Site 1 is an incinerator. Incinerators burn waste. When waste is burned, dioxins and furans are often generated. MWH assumed that “dioxin concentrations in the soil at Site 1 are at concentrations that are comparable to background concentrations, which are unrelated to previous Site 1 activities” (page 3-6, lines 15 and 16). In some places MWH notes that dioxin levels are at concentrations similar to those found in background samples at the site or are consistent with anthropogenic (human-caused) background. In previous documents, we have said that the background sampling at the site was done improperly. Please see the section on “Overall Concerns” for a more detailed discussion of background sampling concerns.

**Response: Comment noted. See response to previous Overall Concerns regarding background sampling.**

- C) We read “no exposure pathways were complete” to mean that if a receptor is not exposed to chemicals through ingestion (eating or drinking), inhalation (breathing), and dermal (skin) exposure, then that exposure does not matter. We disagree with this interpretation and do not think that it is a valid reason for No Further Action on Site 1.



**Response: Comment is unclear. The quoted phrase could not be found in Section 3 of the document. However, to clarify, if there is no exposure, there is no risk.**

Sites 2 and 27 – Sewage Treatment Plan and Sewage Sludge Application Area

*COPCs:* COPCs included aluminum, arsenic, beryllium, chromium, iron, manganese, silver, thallium, vanadium, and zinc.

*HI:* For Site 2, the HI for a future on-site adult resident was 7.0 and for a future on-site child resident was 26.5. These values were from the inhalation of dusts containing *aluminum, manganese, and silver*. For Site 27, HIs for future on-site resident adults and children, future on-site workers, and future off-site consumers of beef and milk, were greater than one. These values ranged from 1.9 (future off-site adult consumer of beef and milk) to 41.2 (future on-site child resident). These values were from the inhalation of dusts containing *aluminum, manganese, and silver*, and from the ingestion of *silver*.

*Cancer Risk:* No pathways had cancer risks that were greater than  $1.0 \times 10^{-4}$ .

*Ecological Concerns:* No COCs were identified for ecological receptors.

*MWH Recommendations:* MWH recommended that no further remediation activities take place at Sites 2 and 27 for an industrial use situation.

*Henshel EnviroComm Recommendations:* Due to inhalation of dusts containing aluminum, manganese, and silver, future on-site workers have a HI of 2.3. Aluminum and manganese have been associated with problems in the nervous system and silver (through ingestion, not inhalation) causes argyria, which is a discoloration of the skin. Based on this HI and the effects on the nervous system that are possible from inhaling aluminum or manganese, we recommend carrying this site through to the feasibility study.

**Response: As a result of the feasibility study, it was determined that for the future intended industrial use, there is no human health concern. In Section 4.4.1.3, we state that the dust exposure pathway (which is the basis for the HI of 2.3) should not be a concern based on the overly conservative assumptions used to calculate the risk. Please also note that we intend to revise this section to more clearly state why the inhalation exposure pathway should not pose a human health concern. A similar discussion as provided for Site 1 will be included.**

Sites 3 and 4 – Explosive Burning Area and Abandoned Landfill/New Burn Site

*COPCs:* COPCs included a variety of metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, manganese, molybdenum, thallium, vanadium, and zinc), polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-

cd)pyrene), dioxins/furans, a pesticide (DDE), and an explosive (4-amino-2,6-dinitrotoluene).

*HI*s: All but one HI for Sites 3 and 4, for future on-site resident adults and children, future on-site workers, and future off-site consumers of beef and milk, values were greater than one. Values ranged from 7.4 (future on-site adult resident) to 26.7 (future on-site child resident). These values were from the inhalation of dusts containing *aluminum*, and *manganese*, and from the ingestion of *aluminum*, *barium*, *cadmium*, and *iron*, either through soil, groundwater, or homegrown vegetables. *Lead* in the soil is also a concern for future on-site residents.

*Cancer Risk*: The cancer risk was greater than acceptable levels for the following receptors:

- Future on-site adult living in the trench area:  $1.2 \times 10^{-4}$  for the incidental ingestion of *arsenic* in groundwater, soil, and in homegrown fruits and vegetables.
- Future on-site adult living in the burn area of the new burn site  $2.7 \times 10^{-4}$  for incidental ingestion of *benzo(a)pyrene* and a *dioxin* (2,3,7,8-tetrachlorodibenzo-*p*-dioxin) in soil, ingestion of a *dioxin* (2,3,7,8-tetrachlorodibenzo-*p*-dioxin), *benzo(a)anthracene*, *benzo(b)fluoranthene*, and *dibenzo(a,h)anthracene* in homegrown fruits and vegetables, and ingestion of *arsenic* in groundwater.
- Future on-site adult living in the new burn site (outside of the burn area):  $1.2 \times 10^{-4}$  for the ingestion of *arsenic* in homegrown fruits and vegetables and groundwater.
- Future on-site child living burn area of the new burn site:  $1.8 \times 10^{-4}$  for the incidental ingestion of *benzo(a)pyrene* in soil and homegrown fruits and vegetables and of *arsenic* in groundwater.

*Ecological Concerns*: *Aluminum*, *barium*, *cobalt*, *manganese*, *nickel*, and *zinc*, were higher at Sites 3 and 4 than in reference areas. Plants and the white-footed mouse had HIs that were higher than HIs in reference areas.

*MWH Recommendations*: MWH recommended institutional controls and monitoring for groundwater. This action would restrict groundwater use at the site and would apply a five-year review. They recommended removal and disposal of contaminated soils. MWH concluded that removing contaminated soils would “allow free access to the property” (page 5-22, lines 11 and 12).

*Henshel EnviroComm Recommendations*: Since city water is available to the site, we agree that the restriction on groundwater use is appropriate. We also agree that removal and disposal of contaminated soil is appropriate. Until we see confirmatory sampling results

after soil removal, we withhold judgment on whether soil removal would lead to free access on the property.

**Response: This is understood. It is the Army's intent to remove soils until satisfactory confirmation sampling is achieved.**

Sites 7 and 21B – Red Lead Disposal Area and Temporary Storage Area at Building 211

*COPCs:* COPCs included aluminum, arsenic, barium, beryllium, chromium, manganese, silver, thallium, vanadium, and zinc.

*HI:* The HI for a future on-site adult resident was 3.4 and for a future on-site child resident was 8.2. These values were from the ingestion of *arsenic* in groundwater. The HI for a future on-site worker was 1.4, which is from the ingestion of *arsenic* in groundwater.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $5.4 \times 10^{-4}$  and for a future on-site child resident was  $1.6 \times 10^{-4}$ . These values were from the ingestion of *arsenic* in groundwater. The cancer risk for a future on-site worker was  $1.6 \times 10^{-4}$ . This value was from the ingestion of *arsenic* in groundwater.

*Ecological Concerns:* No COCs were identified for ecological receptors.

*MWH Recommendations:* MWH recommended institutional controls and monitoring for groundwater. This action would restrict groundwater use for in the contaminated area at the site and would provide monitoring for ten years.

*Henshel EnviroComm Recommendations:* We agree with MWH's recommendations.

**Response: No response necessary.**

Sites 9 and 10 – Burning Ground at Gate 19 Landfill and Gate 19 Landfill

*COPCs:* COPCs included metals (aluminum, antimony, arsenic, barium, beryllium, chromium, manganese, molybdenum, silver, vanadium, and zinc), polycyclic aromatic hydrocarbons (benzo(a)pyrene and benz(a)anthracene), an explosive (1,3,5-trinitrobenzene), and a semi-volatile organic compound (4-chloro-3-cresol).

*HI:* The HIs for a future on-site adult ranged between 1.4 and 8.3, from ingestion of *manganese* in groundwater, homegrown fruits and vegetables. The HIs for a future on-site child ranged between 3.7 and 23.4, from ingestion of *manganese* in groundwater, homegrown fruits and vegetables, and soil. The HI for a future on-site worker was 2.3 and was from inhalation of *manganese* in dusts.

*Cancer Risk:* No pathways had cancer risks that were greater than  $1.0 \times 10^{-4}$ .

*Ecological Concerns:* Levels of *aluminum*, *beryllium*, *cobalt*, *manganese*, and *zinc* were higher at the site than in reference sites and the HIs showed that there might be negative

effect on plants and soil fauna (worms, insects, and microbes living in the soil). However, MWH assumed that there would be no negative effects because no negative effects were observed on plants or earthworms. HIs also showed that there might be a negative effect on animals living in the water, but MWH stated that “since no comparison to reference area sediment were made, these risks may not be above the background conditions at the site” (page 7-12, lines 24 and 25).

*MWH Recommendations:* The site is north of the firing line and will be incorporated into the Big Oaks National Wildlife Refuge. MWH recommended no further action with restricted use (because it is north of the firing line) and stated, that based on the anticipated land use, “there are no exposure pathways that would pose a human health or ecological concern” (page 7-13, lines 26 and 27).

*Henshel EnviroComm Recommendations:* We agree with MWH’s recommendations that negative human health effects are unlikely under the anticipated addition of the site to the wildlife refuge. However, we disagree that there are no risks to wildlife simply because effects on plant reproduction and growth and earthworm mortality were not observed. Metals bioaccumulate and their negative health effects may not be immediately observable in endpoints such as growth or mortality, especially in plants and earthworms. Further, we disagree with the conclusion that “since no comparison to reference area sediment were made, these risks may not be above the background conditions at the site” (page 7-12, lines 24 and 25). Until background comparisons can be made, the health of sensitive ecological receptors (i.e., great blue herons) should be monitored by refuge staff.

**Response: Refer to the 3<sup>rd</sup> paragraph of Section 7.6.1. The driving concern in the pond was vanadium sediment concentration. In review of the Middle Fork Creek (MFC) sediment data, the maximum concentration of vanadium in the pond at Sites 9/10 was less than the maximum upstream concentration in MFC. Thus vanadium concentrations appear to be similar to background. Refer to Resolution of USEPA Comments, Comment No. 1.**

Site 12A – Building 602 Solvent Pit

*COPCs:* COPCs included metals (aluminum, silver, thallium, vanadium, and zinc) and volatile organic carbons (1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, acetone, chloroform, toluene, trichloroethylene, and vinyl chloride).

*HIs:* The HI for a future on-site adult resident was 109 and for a future on-site child resident was 243. These values were from the ingestion, skin absorption, and inhalation (in the shower) of 1,1,1-trichloroethane. Ingestion of 1,1-dichloroethane and 1,1-dichloroethylene in the groundwater also contributed to these values. The HI for a future on-site worker was 36 and was from the ingestion of 1,1,1-trichloroethane and 1,1-dichloroethylene in groundwater.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $1.7 \times 10^{-2}$  and for a future on-site child resident was  $7.4 \times 10^{-3}$ . These values were from the ingestion, skin absorption and inhalation (in the shower) of *1,1-dichloroethylene*, *1,2-dichloroethane* and *vinyl chloride*. *1,1,2-trichloroethane* was also a concern for the future adult resident. The cancer risk for a future on-site worker is  $4.3 \times 10^{-3}$ , from the ingestion of *1,1-dichloroethylene*, *1,2-dichloroethane*, and *vinyl chloride* in groundwater.

*Ecological Concerns:* No COCs were identified for ecological receptors.

*MWH Recommendations:* MWH recommended institutional controls and monitoring for groundwater. This action would restrict groundwater use for in the contaminated area at the site and would provide monitoring for ten years.

*Henshel EnviroComm Recommendations:* We agree with MWH's recommendations, as long as this site is restricted to industrial reuse and not residential reuse.

**Response: No response necessary.**

#### Site 12B – Building 617 Solvent Pit

*COPCs:* COPCs included metals (aluminum, chromium, silver, thallium, vanadium, and zinc) and volatile organic carbons (*1,1-dichloroethane*, *1,2-dichloroethane*, *1,1-dichloroethylene*, *1,2-dichloroethylene*, *1,1,1-trichloroethane*, *1,1,2-trichloroethane*, benzene, carbon disulfide, chloroform, pentachlorophenol, trichloroethylene, and vinyl chloride).

*HI:* The HI for a future on-site adult resident was 86 and for a future on-site child resident was 195. These values were from the ingestion, skin absorption, and inhalation (in the shower) of *1,1,1-trichloroethane*. Ingestion of *1,1-dichloroethane* and *1,1-dichloroethylene* and *1,1,2-trichloroethane* in the groundwater also contributed to these values. Inhalation of *1,2-dichloroethane* while in the shower also contributed to the value for the future child resident. The HI for a future on-site worker was 36 and was from the ingestion of *1,1,1-trichloroethane* and *1,1-dichloroethylene* in groundwater.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $6.7 \times 10^{-2}$  and for a future on-site child resident was  $3.0 \times 10^{-2}$ . These values were from the ingestion, skin absorption and inhalation (in the shower) of *1,1-dichloroethylene*, *1,2-dichloroethane*, *1,1,2-trichloroethane* and *vinyl chloride*. *Trichloroethylene* was also a concern for the future adult resident through groundwater ingestion. The cancer risk for a future on-site worker is  $1.8 \times 10^{-2}$ , from the ingestion of *1,1-dichloroethylene*, *1,2-dichloroethane*, *1,1,2-trichloroethane*, and *vinyl chloride* in groundwater.

*Ecological Concerns:* No COCs were identified for ecological receptors.

*MWH Recommendations:* MWH recommended institutional controls and monitoring for groundwater. This action would restrict groundwater use for in the contaminated area at the site and would provide monitoring for ten years.

*Henshel EnviroComm Recommendations:* We agree with MWH's recommendations, as long as this site is restricted to industrial reuse and not residential reuse.

**Response: No response necessary.**

Site 12C – Building 279 Solvent Pit

*COPCs:* COPCs included metals (aluminum, chromium, silver, thallium, vanadium, and zinc) and volatile organic carbons (1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, toluene, trichloroethylene, and vinyl chloride).

*HI:* The HI for a future on-site adult resident was 86 and for a future on-site child resident was 193. These values were from the ingestion, skin absorption, and inhalation (in the shower) of 1,1,1-trichloroethane. Ingestion of 1,1-dichloroethane and 1,1-dichloroethylene and trichloroethylene in the groundwater also contributed to these values. The HI for a future on-site worker was 28 and was from the ingestion of 1,1,1-trichloroethane, 1,1-dichloroethylene, and trichloroethylene in groundwater.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $1.6 \times 10^{-2}$  and for a future on-site child resident was  $7.3 \times 10^{-3}$ . These values were from the ingestion, skin absorption and inhalation (in the shower) of 1,1-dichloroethylene, 1,1,2-trichloroethane, trichloroethylene, and vinyl chloride. 1,2-dichloroethane was also a concern for the future adult resident through groundwater ingestion. The cancer risk for a future on-site worker is  $4.3 \times 10^{-3}$ , from the ingestion of 1,1-dichloroethylene, 1,1,2-trichloroethane trichloroethylene, and vinyl chloride in groundwater.

*Ecological Concerns:* No COCs were identified for ecological receptors.

*MWH Recommendations:* MWH recommended institutional controls and monitoring for groundwater. This action would restrict groundwater use for in the contaminated area at the site and would provide monitoring for ten years.

*Henshel EnviroComm Recommendations:* We agree with MWH's recommendations, as long as this site is restricted to industrial reuse and not residential reuse.

**Response: No response necessary.**

Site 14 – Yellow Sulfur Disposal Area

*COPCs:* COPCs included aluminum, arsenic, barium, beryllium, chromium, molybdenum, silver, thallium, vanadium, and zinc.

*HIs:* The HI for a future on-site adult resident was 3.3 and for a future on-site child resident was 7.7. These values were from the ingestion of *arsenic* in groundwater. The HI for a future on-site worker was 1.6, which is from the ingestion of *arsenic* in groundwater.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $6.0 \times 10^{-4}$  and for a future on-site child resident was  $2.8 \times 10^{-4}$ . These values were from the ingestion of *arsenic* in groundwater. The cancer risk for a future on-site worker was  $1.8 \times 10^{-4}$ . This value was from the ingestion of *arsenic* in groundwater.

*Ecological Concerns:* Levels of *barium* and *lead* were higher at the site than in reference sites and the HIs showed that there might be negative effect on plants and soil fauna (worms, insects, and microbes living in the soil). However, the removal of contaminated soils from this area reduced HIs to levels comparable to reference HIs.

*MWH Recommendations:* MWH recommended institutional controls and monitoring for groundwater. This action would restrict groundwater use for in the contaminated area at the site and would provide monitoring for ten years. MWH also recommended removal of contaminated soils to reduce metal movement into groundwater.

*Henshel EnviroComm Recommendations:* We agree with MWH's recommendations, as long as this site is restricted to industrial reuse and not residential reuse.

**Response: No response necessary.**

Site 21A and 30 – Building 204 Temporary Storage Area

*COPCs:* COPCs included aluminum, chromium, silver, thallium, vanadium, zinc, and dieldrin (a pesticide).

*HIs:* The HI for a future on-site adult resident was 1.95 and for a future on-site child resident was 5.7. These values were from the ingestion of *dieldrin* in homegrown fruits and vegetables. For the future on-site adult and child residents, these values lower to 0.7 and 2.0, respectively, for homegrown fruits and vegetables, when the *dieldrin* mixes well with the subsurface soil. The HI for a future on-site worker was 0.06.

*Cancer Risk:* The cancer risk for a future on-site adult resident was  $6.5 \times 10^{-4}$  and for a future on-site child resident was  $3.8 \times 10^{-4}$ . These values were from the ingestion of *dieldrin* in homegrown fruits and vegetables. For the future on-site adult and child residents, these values lower to  $2.3 \times 10^{-4}$  and  $1.4 \times 10^{-4}$ , respectively, for homegrown fruits and vegetables, when the *dieldrin* mixes well with the subsurface soil. The cancer risk for a future on-site worker was  $7.9 \times 10^{-5}$ .

*Ecological Concerns:* No COCs were identified for ecological receptors.

*MWH Recommendations:* MWH recommended removal and disposal of contaminated soils. MWH concluded that removing contaminated soils would “allow free access to the property” (page 12-12, line 27).

*Henshel EnviroComm Recommendations:* We agree that removal and disposal of contaminated soil is appropriate. Until we see confirmatory sampling results after soil removal, we withhold judgment on whether soil removal would lead to free access on the property.

**Response:** No response necessary regarding the remedial action proposed for the site. It is the intent to remove soils until satisfactory confirmation testing is achieved.

**Note on Ordnance Removal South of the Firing Line**

The Ordnance/Explosives and Environmental Services Division of American Technologies Inc., removed detected ordnance and explosives (OE), which included unexploded ordnance (UXO) and ordnance scrap from the surface and subsurface soil of an area south of the firing line. This area was a 312 acre wooded parcel west of Tokyo Road, south of Woodfill Road, and east of Perimeter road. Sites from the *Draft Final Feasibility Study* closest to this area included 1, 2, 9, 10, 12A, and 27.

Of the 5,489 geophysical anomalies (basically, beeps on a special metal detector indicating a metal object beneath the soil) found in the subsurface soil, only one was live (a signal flare). Most (4,798 or 87%) of the anomalies were non-OE scrap and 7% (391) were OE scrap. Of the remaining anomalies, 269 (5%) were too deep to reach and 32 (1%) were items planted (“seed” items) to determine the accuracy of the detection equipment.

American Technologies Inc. was confident that “all potentially hazardous OE and/or OE-related scrap was removed to its detection depth in the area where clearance activities occurred” and that “there is little chance that significant OE-related hazards exist on the 312-acre site.”

**Response:** This comment is not applicable to the FS.

**Note on Preclosure of the Open Burning Unit**

The *Final Soil and Groundwater Analysis Summary Report* for the Preclosure of the Open Burning Unit summarized the baseline program for the Open Burning Unit (OB). The baseline program included analysis of surface and subsurface soils and groundwater. The OB unit (also called Lee Field) is a 12 acre area of land located in the southeast portion of the Cantonment Area, east of Shun Pike Road. This area was used to treat bulk propellants, which involved burning these materials. It is anticipated that future land use of this site will be industrial and/or agricultural and not residential. The risk assessment, however, evaluated commercial/industrial workers, construction workers, agricultural workers, and future adult and child residents.

COPCs for the OB unit included *arsenic, iron, lead, and manganese* in the surface and subsurface soil, *acetone, beta-BHC, bis(2-ethylhexyl)phthalate, cyanide, and nitroglycerin* in the groundwater. Kepone (a carcinogenic pesticide) was present in groundwater, but was not considered a COPC because the groundwater was cloudy, the lab testing the



groundwater “estimated” the kepone concentration because of variation in sample results, and the EPA has no definitive PRG for kepone.

*HIs* for the COPCs at the OB unit were all reported as less than one. The conclusion was that “adverse noncarcinogenic health effects are not anticipated under the conditions established in the exposure assessment.”

*Cancer risks* for the COPCs at the OB unit were between  $1.6 \times 10^{-5}$  and  $5.2 \times 10^{-5}$ . These values are within the EPA’s target risk range of  $1.0 \times 10^{-6}$  to  $1.0 \times 10^{-4}$ , but exceeded the *Closure Plan* goals for the OB unit. The primary drivers for these values were *arsenic* in surface soils and *bis(2-ethylhexyl)phthalate* in groundwater. These values were downplayed in the *Final Soil and Groundwater Analysis Summary Report*. According to the report, the arsenic only “marginally exceeded” the site background concentrations and the bis(2-ethylhexyl)phthalate, “a common laboratory contaminant,” was not detected in the two most recent groundwater sampling rounds.

*Ecological concerns* for the OB unit included *lead* and *manganese* as COPCs. Potential risks from lead exposure exceeded acceptable limits for several receptors. Manganese posed less of a risk. The report recommended reducing the lead levels in the upper 18 inches of surface soil from the Historical Burn Area. However, the report suggested that “the need for performing this remediation must be considered in light of the small size of the site and abundance of similar habitat elsewhere on JPG and the surrounding landscape.”

We have several concerns with the *Final Soil and Groundwater Analysis Summary Report* regarding the OB unit. Any time organic materials are burned, several contaminants are likely to result from the burning or were likely used to facilitate the burning. Contaminants that result from burning organic materials are dioxins and furans. Dioxins and furans are compounds that contain chlorine and are known to be associated with countless effects on both human and non-human receptors. The OB unit was not even tested for the presence of these contaminants in the soil, subsurface soil, or groundwater. If these media were tested for dioxins and furans, the results were not included in the report. Further, perchlorates were either not tested for or the results were not included in the report. Perchlorates and chlorates are compounds commonly used as oxidizers in pyrotechnics – they help the burning process. Common chlorates and perchlorates include ammonium perchlorate, barium chlorate, potassium chlorate, and potassium perchlorate. It is reasonable to assume that the Army used these compounds to facilitate the burning of materials in the OB unit, but the potential for these compounds to exist in the OB unit was never acknowledged in the *Final Soil and Groundwater Analysis Summary Report*. Finally, the downplay of human health and ecological risks because of analysis problems in the laboratory or because the site is “too small to pose a problem” are not acceptable.

**Response: This comment is not applicable to the FS.**

**Table 1.** Jefferson Proving Ground *Draft Final Feasibility Study* (March 2003) site recommendations from Montgomery Watson Harza and Henshel EnviroComm, RAB TAPP consultants.

<i>Site Number and Name</i>	<i>Montgomery Watson Harza Recommendations</i>	<i>Henshel EnviroComm Recommendations</i>
1 – Building 185 Incinerator	No Further Action	Move to FS
2/27 - Sewage Treatment Plant & Sludge Application Areas	No Further Action	Move to FS
3/4 - Explosive Burn Area & Abandoned Landfill/New Burn Site	Institutional controls and monitoring for groundwater  Soil removal and disposal for contaminated soils	Agree with institutional controls and monitoring for groundwater  Withhold judgment regarding soils until confirmatory samples for soil removal are available
7/21B - Red Lead Disposal Area & Bldg. 211	Institutional controls and monitoring the groundwater for arsenic	Agree with institutional controls and monitoring the groundwater for arsenic
9/10 - Burning Ground South of Gate 19 Landfill Gate 19 Landfill	No Further Action	Institute monitoring of sensitive ecological receptors
12A - Solvent Pit (Bldg. 602)	Institutional controls and monitoring the groundwater for volatile organic carbons	Agree with institutional controls and monitoring the groundwater for volatile organic carbons as long as residential reuse is restricted
12B - Solvent Pit (Bldg. 617)	Institutional controls and monitoring the groundwater for volatile organic carbons	Agree with institutional controls and monitoring the groundwater for volatile organic carbons as long as residential reuse is restricted
12C - Solvent Pit (Bldg. 279)	Institutional controls and monitoring the groundwater for volatile organic carbons	Agree with institutional controls and monitoring the groundwater for volatile organic carbons as long as residential reuse is restricted
14 - Yellow Sulfur Disposal Area	Institutional controls and monitoring the groundwater for volatile organic carbons  Soil removal and disposal for contaminated soils	Agree with institutional controls and monitoring the groundwater for volatile organic carbons as long as residential reuse is restricted  Agree with soil removal plans
21A/30 - Temporary Storage Area (Bldg. 204) & Adjacent Shed	Soil removal and disposal for contaminated soils	Withhold judgment regarding soils until confirmatory samples for soil removal are available

**Response: Sites 1 and 2/27 were brought into the FS for evaluation, which determined that no remedial action is warranted at these sites for the intended future land use (see previous responses). All remedial action soil removal will be performed until confirmation sampling indicates that residual soils meet PRGs. Refer to responses to specific comments.**

LAB\MWK  
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-----Original Message-----

From: Dewitt, Jamie [<mailto:jadewitt@indiana.edu>]

Sent: Tuesday, August 05, 2003 4:36 PM

To: Evens, Andrew B

Cc: phill@venus.net; Henshel, Diane S.; Mason-Smith.Karen@epamail.epa.gov; Kherron@dem.state.in.us; pdcloud@sbccom.apgea.army.mil

Subject: Site 1 Dioxins Issue

Hi Brooks,

Please note that I cc'd half of the world on this Email (Richard, Diane, Karen, Kevin, and Paul). I think Leslie and Mike wanted to see this as well, but I do not have their Emails.

Attached is an Excel spreadsheet I put together on the dioxin and furan data from Site 1, Building 185 Incinerator. As you know, in the RAB comments on the Draft Final FS, we disagreed with "No Further Action" for this site because of the dioxin/furan issue. After reviewing the background data and the site data on dioxins/furans, we still agree that this site should move forward to the FS. The congeners that tend to be emitted in the highest amounts (> 10% of total PCDDs and PCDFs emitted) from municipal waste incinerators include the penta-, hexa-, and hepta-substituted furans, hepta-substituted dioxins, and OCDD. Since these congeners are higher at Site 1 than in background, it is our interpretation that dioxins at Site 1 did indeed come from activities at Site 1.

We averaged the "new" background samples (BKG51SF036, 037, 038, 039, and 040) and then the two Site 1 samples (INC01SF003 and INC01SF004). Briefly, the spreadsheet contains the following information:

Summary tab: This summarizes the TEQ analysis I did for the dioxins and furans. Note Column D: Quotient. This is the Site 1 TEQ divided by the Background TEQ. TEQs for Site 1 are all 1.2 - 2.3 times larger than the TEQs for background.

TEQ tab: This lays out the average congener concentrations for Site 1 and background, TEFs from four different studies, TEQs based on each site, each study, and for each congener, and then total TEQs for each study, all congeners. Full references for the TEFs are included.

Data tab: Just raw data taken from the RI. Please note Column M-O; these show average site/average background, site-background in ug/g, and site-background in ng/g. Except for OCDDs, Site 1 is higher for all congeners than background.

Graphed data tab: Graph of the raw data. Please let me know if you have any questions.



Jamie Site1TEQs.xls

\\Usmad1s02\\Main\\Jobs\\244\\0025\\01\\103\\Site 1 Dioxins Comment from RAB.doc

## JPG Site 1 Dioxin Response

The comparative analysis performed to compare PCDD and PCDFs congeners in the Site 1 soil data to the background soil samples was very complete. We appreciate your efforts!

This comparative analysis shows that, depending on the toxicity equivalency factors (TEFs) used to compare the congener concentrations on a 2,3,7,8-TCDD equivalent basis, results in a range of average 2,3,7,8-TCDD equivalent concentration in Site 1 soils from 1.2 to 2.3 times the background concentrations. In our opinion, such small differences in site and background concentrations have been interpreted as being comparable to one another. Even if the largest difference calculated between the background and investigative sample results are used to calculate cancer risk estimates (i.e., 2.3), this would be like comparing a cancer risk of  $1 \times 10^{-4}$  versus  $2 \times 10^{-4}$ , which equates essentially to the same cancer risk.

However, it is important to note that the background comparison was only one criterion used to evaluate the dioxin data for purposes of the FS. The other more important criterion used was the calculated cancer risk based on the Site 1 data. Within the RI, the residential exposure scenario was evaluated and the cumulative cancer risk was  $1.1 \times 10^{-4}$ , which slightly exceeded the upper end of the USEPA risk goal of  $1 \times 10^{-4}$ . It should be noted too that the primary exposure pathway that resulted in 99 percent of the  $1.1 \times 10^{-4}$  cancer risk for on-site residents was the consumption of beef and milk produced on this property. This sort of activity does not currently occur at Site 1 and will not in the future (i.e., the site is intended for Industrial use). For this reason, if the beef and milk consumption had not been factored into the residential risk scenario, the cumulative cancer risk for site 1 (i.e.,  $5.5 \times 10^{-5}$ ) would have been much less than  $1 \times 10^{-4}$ . However, a land use restriction will be put on Site 1 so that no residential development occurs in the future. Site 1 will continue to be used as commercial/industrial property in the future. Under this Industrial scenario, the cumulative cancer risk would be less than the  $1 \times 10^{-4}$  cumulative cancer risk goal. This information, along with the comparability of the dioxin results to background, provided the basis for making the decision to not move Site 1 forward in the FS for remediation.

It is proposed that MWH revise the Draft FS to more clearly explain the rationale used to eliminate Site 1 from further remedial consideration, and clarify that institutional controls will be implemented in the form of deed restrictions preventing residential use of the property. The above rationale would be provided in the revised FS.

**A4**

**Meeting Minutes - Resolution of Geology Issues**

## MEETING MINUTES



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**Meeting Purpose:** Resolution of Geology issues and comments pertaining to the March 2003 Draft Final FS, Jefferson Proving Ground

**Meeting Date:** 31, July 2003

**Location:** Jefferson Proving Ground, Madison, Indiana

**Attendees:** Paul Cloud – Army  
Brooks Evens – USACE  
Kevin Herron – IDEM PM, Becky Travis – IDEM Geologist  
Karen Mason Smith – EPA PM  
Rob Young – TechLaw PM  
Leslie Busse – MWH Task Order Manager  
Leo Linnemanstons – MWH Hydrogeologist

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New wells are proposed for Sites 3/4, 12A, 12B, and 12C as part of the remedial action alternatives evaluation. The project team visited these sites, then discussed the issues as follows:

**Sites 3 /4:** During the site visit, hand augers were performed to evaluate whether the unconsolidated soils were sufficiently thick to install a conventional monitoring well. The hand augers were conducted at the proposed locations agreed to based on the MWH memorandum dated June 30, 2003. The hand augers were conducted to a depth of 4 ft without encountering bedrock or groundwater. Soils were predominantly silty although a larger fraction of sand was noted towards the bottom of the auger holes. Based on these results, sufficient unconsolidated soils are present to install conventional monitoring wells at these locations. If during drilling, bedrock is encountered at less than 5 ft below ground surface, the annular and surface seals for the monitoring wells will be shortened proportionally to accommodate the available length. The well screen will be either 5 or 10 ft long depending on the depth to groundwater, and the well screen will extend at least one foot above the bedrock/till interface.

The agreed locations proposed by the memorandum (attached) are adequate, and these locations were staked and flagged. USEPA and IDEM will be present during well installation so that field decisions may be made regarding final well locations or well construction. UXO support is required for drilling of the two wells, and an off-site access agreement is required. Grubbing and brushing will be necessary from the road to the well

locations, and an ATV-mounted drilling rig will be used. The USACE will negotiate and secure the access agreement. USEPA and IDEM agreed that sampling these wells for VOCs only is sufficient for sentry monitoring.

**Site 12A:** Two wells were proposed to be installed at the till/loess interface. USEPA recommended a total of three new wells. Their recommendation was based on a desire to better define the groundwater flow direction at the till/loess interface. However, upon review of historical data regarding the groundwater flow at the till/loess interface, they agreed that two wells is adequate because they are positioned parallel to the historical groundwater flow direction. Depending on the monitoring results for the two new wells, additional information (i.e. possibly including one or more additional wells) may be required to determine the direction of flow or the extent of VOC contamination at the till/loess interface.

The locations for the two new wells were agreed and marked at the site. The general FS conclusion (monitoring and land use restrictions) is agreed by the project team. The monitoring program will be identified in the RD plan. The reference to 10-year monitoring plan will be removed and replaced with performance based monitoring schedule.

**Site 12B:** Three new wells were proposed to be installed with two wells installed at the till/loess interface and the third well installed at the till/bedrock interface; however, it was agreed during the meeting to install one additional well at the till/loess interface based on the initial recommendation by IDEM and reinforced by USEPA. Their recommendation was based on a desire to better define the groundwater flow direction at the till/loess interface. Upon review of historical data regarding the groundwater flow at the till/loess interface, the predominant groundwater flow direction varied from southeast to southwest. To provide adequate coverage at the till/loess interface, the team agreed that a total of three wells will be adequate to assess the potential for groundwater contamination along the till/loess interface and to determine groundwater flow direction at the till/loess interface. Depending on the monitoring results for the three new wells, additional information (i.e. possibly including one or more additional wells) may be required to determine the direction of flow or the extent of VOC contamination at the till/loess interface.

The locations for the three till/loess wells and the one till/bedrock well were agreed and marked at the site. The general FS conclusion (monitoring and land use restrictions) is agreed by the project team. The monitoring program will be identified in the RD plan. The reference to 10-year monitoring plan will be removed and replaced with performance based monitoring schedule.

**Site 12C:** It was agreed by the team that Site 12C does not require new wells and that the general FS conclusion (monitoring and land use restrictions) is appropriate. The monitoring program will be identified in the RD plan. The reference to 10-year monitoring plan will be removed and replaced with performance based monitoring schedule.



**General Discussion on Monitoring and Reporting:** During the team meeting, general points about the contents of the RD Workplan and subsequent performance reporting were discussed.

USEPA requested that the following additional information be presented in the RD plan:

- Update geologic cross-section through the site with information from the new monitoring well borings.
- Provide potentiometric surface maps for each monitored depth interval (i.e., till/loess interface, till/bedrock interface, and bedrock).
- Provide table defining the purpose of the well (i.e., source, in-plume, compliance) and type (i.e., till/loess interface, till/bedrock interface, and bedrock), and plume position (up-, side-, or down-gradient).

IDEM requested that long-term monitoring, performance evaluation, and reporting include the following:

- Long-term monitoring should initially be conducted on a quarterly basis for a minimum of two years to establish data trends and seasonal variations. The monitoring program for each site should consist of all the permanent monitoring wells and the parameters should be for the contaminants of concern. In addition, natural attenuation parameters will be collected for Sites 12A, 12B, and 12C.
- Federal maximum contaminant levels (MCLs) will be used as the performance standard for groundwater monitoring.
- Annual performance reporting will present data collected in the current year and be summarized and evaluated with historic data. The report will include updated historic tables and drawings presenting data from the current year. Graphs of trends will be included as appropriate to illustrate data trends and to estimate rates.
- After the initial 2-years of long-term monitoring, the team will meet to review the performance of the monitoring program and will discuss recommendations for modifications to the number of wells, frequency of sampling, and monitored parameters. Subsequently additional modifications may be reviewed and discussed annually, as appropriate.

**A5**

**Comments and Responses on the Draft Proposed Plan**

**JPG COMMUNITY RAB**  
**PO Box 813**  
**Madison, IN 47250**

December 2, 2003

Mr. Paul Cloud  
U.S. Army Soldier, Biological and Chemical Command  
5183 Blackhawk Road  
Aberdeen Proving Ground, MD 21010-5424

Dear Mr. Cloud:

Please be advised that the Community RAB will probably be submitting more detailed and specific comments on the Proposed Plan for JPG when that plan becomes available for public comment. However, since we do possess a copy of the draft we thought this would be a good time to make a few preliminary comments, which in our opinion may clarify or improve the publicly available product.

The description rendered in the Introduction, Regulatory Chronology section seems fairly complete and understandable. However, we have a suggestion. That would be to cite how many sites were considered in the RI. The first paragraph of the Regulatory Chronology section (page 3) does state that only 15 sites were brought forward into the FS. But, realizing that many community people who read the Proposed Plan may not have followed the RI/FS process since its inception and through all of its phases, it would be good to give them that number so that they may have a better understanding of the scope of the total JPG restoration project.

Also, later in this section (page 4) it appears that in the first bullet in the second set of bullets there is either a word missing or an extra word mistakenly inserted. It reads: "Additional risk assessment evaluation of based on intended land use for each site." It seems that there could possibly be a word left out after the "of"; or, perhaps the "of" should have been omitted completely.

In the details concerning each individual site it appears that they are not all quantified as to their size. I did find dimensions or approximate sizes relating to most of the areas, but not for sites 27, 7, 21B, and 14. Those of us familiar with the JPG restoration are more aware of such things than the general public. We also know that most of the sites are quite small areas (on the magnitude of square or cubic feet, rather than acres). However, the public may very well not realize this. So, to give the general public a greater appreciation of the true scale it would be best to give them this information.

In the section regarding Site 3 and 4, page 10, third paragraph, last line the word "is" seems to be inappropriately inserted. It states: "... to exceed is USEPA Region 9 PRGs and were retained as COPCs in soils."

That is all that we have at present. We appreciate the opportunity to review this document and hope that our suggestions will be considered.

Sincerely,

Richard Hill  
JPG RAB Community Co-chair

cc: Karen Mason-Smith, USEPA  
Kevin Herron, IDEM  
Henshel Enviro-Com  
Brooks Evens, USACE  
Ken Knouf, JPG Site Manager  
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December 2, 2003

Richard Hill  
JPG RAB Community Co-chair  
JPG COMMUNITY RAB  
PO Box 813  
Madison, IN 47250

Dear Mr. Hill:

This memo is in regard to the Draft Proposed Plan (the plan) for Jefferson Proving Ground and is intended for your use as a supplement to the comments on the plan by the Community RAB.

In the "Regulatory Chronology" section on page 3, lines 5 and 6 contain the sentence "...several sites be removed from the RI/FS process because they did not pose a risk to human health and the environment exceeding USEPA risk-based criteria..." It would be quite easy for a concerned community member to interpret that there were no risks at the sites removed from the RI/FS process. We recommend changing the wording to "...because they did not pose *an unacceptable* risk..." We suggest that similar wording be changed throughout the plan so that "no risk" is altered to "no unacceptable risk."

In the "Regulatory Chronology" section on page 4, lines 18-21, Sites 1, 2/27, and 9/10 are referenced as sites that were brought into the FS but were recommended for NFA. This section notes that these three sites will be summarized in the plan but that "no remediation is necessary." This supposition seems somewhat premature in this section; we recommend that these five lines be removed from this section.

At all sites with contaminated groundwater (Sites 3/4, 7/21B, 12A, 12B, 12C, and 14), we recommend groundwater monitoring indefinitely, at least until the groundwater plumes for all contaminants are fully understood and it is agreed upon by all concerned parties that monitoring is no longer necessary.

Overall, this plan, at this point in time, seems adequate, provided that the institutional controls, notably those that restrict residential use or groundwater use, are instituted in perpetuity.

Sincerely,

Jamie DeWitt  
Henshel EnviroComm  
Bloomington, IN 47401

N:\Jobs\244\0025\01\104\RAB Comments on PP.doc

3-END

**RESPONSE TO RAB COMMENT  
PROPOSED PLAN**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

The RAB reviewed the Draft Proposed Plan and submitted comments dated December 2, 2003, which are included within this appendix. All of the RAB comments have been included in this revised Proposed Plan.

**REVIEW OF THE DRAFT PROPOSED PLAN  
DATED OCTOBER 2003**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

**Submitted by:**

**Ms. Karen Mason-Smith, RPM  
U.S. Environmental Protection Agency  
Region 5 (SR-6J)  
77 W. Jackson Boulevard  
Chicago, Illinois 60604**

**Submitted to:**

**Mr. Paul Cloud, BEC  
U.S. Army Soldier and  
Biological Chemical Command  
5183 Blackhawk Road  
Aberdeen Proving Ground, MD 21005-5424**

**December 2, 2003**

/

**REVIEW OF THE DRAFT PROPOSED PLAN  
DATED OCTOBER 31, 2003**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

**GENERAL COMMENTS**

1. The title of the Draft Proposed Plan, dated October 2003 (Draft PP), is misleading. Revise the title to read "Proposed Plan for RI/FS Sites 1, 2/27, 3, 4, 7/21B, 9/10, 12A, 12B, 12C, 14, 21A and 30 at Jefferson Proving Ground, Madison, Indiana." The Draft PP only addresses the fifteen (15) Remedial Investigation (RI) sites that were brought forth into the Feasibility Study (FS), and does not address the other approximately thirty-five (35) RI sites that the Army proposed for no further action. It should be noted that U.S. EPA and the community RAB still have many unresolved comments on some of the other 35 RI sites.

For clarification purposes, U.S. EPA recommends the Proposed Plan state that the 35 RI sites that have been proposed for No Further Action (NFA) in the RI will be documented in a separate NFA Proposed Plan and NFA Record of Decision (ROD). In keeping with the team process, U.S. EPA recommends that the Army work to reach a consensus with the community RAB and U.S. EPA on the unresolved RI/FS issues.

2. The Draft PP indicates that Sites 1 and 2/27 were recommended for No Further Action (NFA) in the FS based on reevaluation of potential risk with respect to the intended future land use. The conclusions sections for these sites indicate that they are "recommended for NFA, Industrial Use," and that deed restrictions will be implemented to prevent residential use. The conclusion sections for each of these sites go on to state that: "The Army, IDEM and US EPA concur with this conclusion." U.S. EPA does not concur with this conclusion. These sites cannot be identified as requiring NFA, since further action in the form of a deed restriction must be performed for each of the properties as part of the transfer process. The Draft PP should be revised to remove the text regarding the NFA recommendations for Sites 1 and 2/27. The implementation of deed restrictions will then be considered the further action for those sites.
3. For sites requiring soil removal (Sites 3/4, 14 and 21A/30), the general remedial action objective (RAO) discussed in the Draft PP is to remediate elevated concentrations of chemicals "to levels that are on average below USEPA Region 9 residential soil Preliminary Remediation Goals (PRGs) or background concentrations, whichever is higher." However, comparing the average concentration of a chemical in soils to U.S. EPA Region 9 PRGs or background concentrations may not be appropriately protective of future receptors, depending on several factors, including the variability of known concentrations of the chemicals in the soil, the locations where confirmatory samples will be collected and the proposed number of confirmatory samples. Therefore, it is recommended that for each site requiring soil removal, the statement above be revised to indicate that chemical in soils will be



remediated "to levels that are below USEPA Region 9 residential soil PRGs or background concentrations, whichever is higher." The number and location of soil samples required to verify that remediation levels are met can then be agreed upon in the confirmatory sampling plan during Remedial Design (RD) activities.

4. Similar to the issue discussed in the previous comment, the general RAO presented in the Draft PP for sites requiring groundwater remediation (Sites 3/4, 7/21B, 12A, 12B, 12C and 14) is to remediate (naturally) elevated concentrations of chemicals in groundwater to levels "that are on average below MCLs." However, remedial decisions are typically made by comparing the concentration of the chemical in groundwater at a particular monitoring well to the maximum contaminant level (MCL) or other appropriate risk-based levels over time. Therefore, for each site requiring groundwater remediation, the statement above should be revised to indicate that chemicals in groundwater will be remediated "to levels that are below MCLs" (or another risk-based level, if the MCL does not exist). The number, depth and location of monitoring wells, and the frequency of sample collection required to verify the remediation levels can then be agreed upon in the long-term groundwater monitoring systems during Remedial Design (RD) activities.
5. In prior comments related to the Draft and Final Remedial Investigation (RI) Reports, U.S. EPA and the Restoration Advisory Board (RAB) expressed concerns about the lack of usable antimony data in soil sample results for several RI sites. Based on the Army's response to RAB Comment 5 on the Draft RI Report (dated August 2, 2002), the Army agreed to address the lack of usable antimony data in the confirmatory sampling programs for sites carried forward in the CERCLA remediation process. However, these issues are not discussed in the FS or Draft PP. For those sites where soils will be removed and there is a lack of usable antimony data, it is recommended that the Draft PP be revised to acknowledge that confirmatory samples will be analyzed for antimony.
6. Please include the actual number for each Preliminary Remediation Goal (PRG) or cleanup target level for soils/sediments and maximum contaminant level (MCL) established under the Safe Drinking Water Act for groundwater.

## SPECIFIC COMMENTS

1. **Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring), Page 13:** This section indicates that groundwater will be monitored for volatile organic compounds (VOCs) and potentially chromium. As indicated in Specific Comment 4 in Appendix A1 of the Draft PP, U.S. EPA made recommendations for perchlorate sampling of the groundwater at Sites 3/4 when commenting on the RI and FS documents for JPG. However, the Army has responded on several occasions (including Appendix A1) that current Department of Defense (DoD) policy will not allow for perchlorate sampling at Sites 3/4. The Army's response regarding DoD's policy regarding sampling for perchlorate is duly noted. However, U.S. EPA's original comment on this issue still stands. The proposed long-term groundwater monitoring program for Sites 3/4 should include perchlorate as a sampling parameter.

2. **Alternatives for Groundwater - Site 12A, Page 20:** This section explains that two monitoring wells will be installed and screened across the till/loess interface, and the new wells will be incorporated into the preferred remedy for Site 12A. The Meeting Minutes provided in Appendix A4 of the Draft PP indicate that U.S. EPA agreed with the installation of the two till/loess interface wells. However, as indicated by U.S. EPA representatives during the meeting, the installation of a total of three monitoring wells screened across the till/loess interface is preferred. Two wells will not provide an adequate indication of long-term groundwater flow conditions in the aquifer at the till/loess interface.
3. **Evaluation of Alternatives for Site 14, Page 29:** This section implies that arsenic will be the only parameter analyzed in the future groundwater monitoring program. However, as indicated in Specific Comment 10 in Appendix A1 of the Draft PP, lead and cobalt were also detected in groundwater samples collected from monitoring wells at Site 14. Therefore, it is recommended that total metals analyses be included in the future groundwater monitoring program for Site 14, with the specific metals to be analyzed agreed upon by Army, U.S. EPA and Indiana Department of Environmental Management (IDEM) personnel at a later date.
4. **Sites 21A/30 - Building 204 Temporary Storage Area, Page 30:** This section indicates that a variety of pesticides and herbicides were stored in Building 204. As indicated in Specific Comment 11 in Appendix A1 of the Draft PP, U.S. EPA recommended soil sampling under the Building 204 concrete slab to confirm the extent of pesticide contamination at the site. The Army's response, as indicated in Appendix A1, states that the Army will not perform additional investigation and includes the Army's rationale for not collecting additional samples. However, the condition of the concrete slab in Building 204 was discussed during the July 29-31, 2003 meeting at JPG, attended by representatives of the Army, U.S. EPA and IDEM. It was agreed during the meeting that if the concrete slab contains cracks that could have allowed pesticides/herbicides to migrate to underlying soils, the soil beneath these cracks would be further investigated. The Draft PP should be revised to state that the Army will evaluate the integrity of the concrete slab within Building 204, and if the slab contains cracks that could have allowed past spills of liquids to migrate to soils below the slab, the soils will be sampled and analyzed for the presence of pesticides and herbicides.

It should be noted that although a concrete slab currently exists in Building 204, the Draft PP states: "the-site may be used as residential by the future landowner." It is therefore important that the soils underlying the slab at Building 204 be properly characterized for potential contamination before the property is transferred, as the future landowner may remove the building and slab, and use the former building site for residential purposes.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

REPLY TO ATTENTION OF:

**SR-6J**

December 2, 2003

ATTN: Mr. Paul Cloud, BRAC Environmental Coordinator  
U.S. Army Soldier and Biological Chemical Command  
5183 Blackhawk Road  
Aberdeen Proving Ground, MD 21005-5424

Subject: Review Comments on the *Draft Proposed Plan for Jefferson Proving Ground in Madison, Indiana, dated October 31, 2003*

Dear Mr. Cloud:

The United States Environmental Protection Agency Region 5 (U.S. EPA) has reviewed the Draft Proposed Plan for the Jefferson Proving Ground (JPG) site in Madison, Indiana (Draft PP). Our review includes comments on whether the Draft PP addresses previous U.S. EPA concerns on the Draft and Final Feasibility Study (FS). Because the Draft PP did not include the other thirty-five (35) Remedial Investigation Report (RI) sites, and only addresses the fifteen (15) RI sites brought forward into the FS, U.S. EPA did not evaluate whether our historical concerns regarding human health and ecological risk assessment had been adequately addressed. At this time, the Draft PP does not appear adequate and therefore, U.S. EPA cannot concur with it.

Please note that General Comment 4 addresses an issue related to the lack of usable antimony data for soils, which was originally identified by U.S. EPA and the Restoration Advisory Board (RAB) Technical Assistance for Public Participation (TAPP) consultant in the review of the RI Report. For sites requiring soil or groundwater remediation, the Draft PP indicates that chemicals of concern will be remediated to levels that are "on average" below U.S. EPA Region 9 Preliminary Remediation Goals (PRGs)/Maximum Contaminant Levels (MCLs) or background concentrations, whichever are higher. U.S. EPA has some concerns with this approach. U.S. EPA has also commented on the proposed comparison of PRGs, MCLs or background concentrations to "average" levels of chemicals in the soil or groundwater.

Thank you for the opportunity to review the Draft PP. This comment letter is being provided to you via electronic mail for your convenience. Please call me at (312) 886-6150 if you have any questions.

Sincerely,

*Karen L. Mason-Smith*  
Karen Mason-Smith

Remedial Project Manager  
Superfund Division

Enclosure

cc: B. Evens, Army COE-Louisville  
K. Herron, IDEM  
L. Busse, MWH  
L. Linnemanstons, MWH  
R. Young, TechLaw Inc.  
R. Hill, JPG RAB  
D. Henshel, JPG RAB TAPP  
J. DeWitt, JPG RAB TAPP

6-END

**RESPONSE TO USEPA DECEMBER 2, 2003 COMMENTS  
DRAFT PROPOSED PLAN**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

Following are the USACE response to comments presented in the U.S. Environmental Protection Agency (USEPA) letter dated December 2, 2003 associated with the Draft Proposed Plan dated October 2003 for the Jefferson Proving Ground. The following numbering system corresponds to the numbers used in the USEPA letter.

**GENERAL COMMENTS**

1. The title of the Draft Proposed Plan, dated October 2003 (Draft PP), is misleading. Revise the title to read "Proposed Plan for RI/FS Sites 1, 2/27, 3, 4, 7/21B, 9/10, 12A, 12B, 12C, 14, 21A and 30 at Jefferson Proving Ground, Madison, Indiana." The Draft PP only addresses the fifteen (15) Remedial Investigation (RI) sites that were brought forth into the Feasibility Study (FS), and does not address the other approximately thirty-five (35) RI sites that the Army proposed for no further action. It should be noted that U.S. EPA and the community RAB still have many unresolved comments on some of the other 35 RI sites.

For clarification purposes, U.S. EPA recommends the Proposed Plan state that the 35 RI sites that have been proposed for No Further Action (NFA) in the RI will be documented in a separate NFA Proposed Plan and NFA Record of Decision (ROD). In keeping with the team process, U.S. EPA recommends that the Army work to reach a consensus with the community RAB and U.S. EPA on the unresolved RI/FS issues.

**Response: The cover of the Proposed Plan has been modified to list the sites included in the document. The Proposed Plan is a summary of the Feasibility Study, in particular the remedial action alternatives and their evaluation for those sites that require remedial action. The sites that were removed from the FS process were not subject to an alternatives evaluation and thus are not included in this FS. The Record of Decision (ROD) will contain a NFA section summarizing all NFA sites and when the sites became NFA within the CERCLA process.**

2. The Draft PP indicates that Sites 1 and 2/27 were recommended for No Further Action (NFA) in the FS based on reevaluation of potential risk with respect to the intended future land use. The conclusions sections for these sites indicate that they are "recommended for NFA, Industrial Use," and that deed restrictions will be implemented to prevent residential use. The conclusion sections for each of these sites go on to state that: "The Army, IDEM and US EPA concur with this conclusion." U.S. EPA does not concur with this conclusion. Theses sites cannot be identified as requiring NFA, since further action in the form of a deed restriction

must be performed for each of the properties as part of the transfer process. The Draft PP should be revised to remove the text regarding the NFA recommendations for Sites 1 and 2/27. The implementation of deed restrictions will then be considered the further action for those sites.

**Response: Comment is incorporated.**

3. For sites requiring soil removal (Sites 3/4, 14 and 21A/30), the general remedial action objective (RAO) discussed in the Draft PP is to remediate elevated concentrations of chemicals “to levels that are on average below USEPA Region 9 residential soil Preliminary Remediation Goals (PRGs) or background concentrations, whichever is higher.” However, comparing the average concentration of a chemical in soils to U.S. EPA Region 9 PRGs or background concentrations may not be appropriately protective of future receptors, depending on several factors, including the variability of known concentrations of the chemicals in the soil, the locations where confirmatory samples will be collected and the proposed number of confirmatory samples. Therefore, it is recommended that for each site requiring soil removal, the statement above be revised to indicate that chemical in soils will be remediated “to levels that are below USEPA Region 9 residential soil PRGs or background concentrations, whichever is higher.” The number and location of soil samples required to verify that remediation levels are met can then be agreed upon in the confirmatory sampling plan during Remedial Design (RD) activities.

**Response: Comment is incorporated.**

4. Similar to the issue discussed in the previous comment, the general RAO presented in the Draft PP for sites requiring groundwater remediation (Sites 3/4, 7/21B, 12A, 12B, 12C and 14) is to remediate (naturally) elevated concentrations of chemicals in groundwater to levels “that are on average below MCLs.” However, remedial decisions are typically made by comparing the concentration of the chemical in groundwater at a particular monitoring well to the maximum contaminant level (MCL) or other appropriate risk-based levels over time. Therefore, for each site requiring groundwater remediation, the statement above should be revised to indicate that chemicals in groundwater will be remediated “to levels that are below MCLs” (or another risk-based level, if the MCL does not exist). The number, depth and location of monitoring wells, and the frequency of sample collection required to verify the remediation levels can then be agreed upon in the long-term groundwater monitoring systems during Remedial Design (RD) activities.

**Response: Comment is incorporated.**

5. In prior comments related to the Draft and Final Remedial Investigation (RI) Reports, U.S. EPA and the Restoration Advisory Board (RAB) expressed concerns about the lack of usable antimony data in soil sample results for several RI sites. Based on the Army’s response to

RAB Comment 5 on the Draft RI Report (dated August 2, 2002), the Army agreed to address the lack of usable antimony data in the confirmatory sampling programs for sites carried forward in the CERCLA remediation process. However, these issues are not discussed in the FS or Draft PP. For those sites where soils will be removed and there is a lack of usable antimony data, it is recommended that the Draft PP be revised to acknowledge that confirmatory samples will be analyzed for antimony.

**Response: Antimony will be included in confirmation sampling performed at sites involving soil excavation and confirmation testing for metals.**

**Antimony is typically not a contaminant of concern unless it was produced at the subject site by the industrial world, such as in tanning industries and other like industries. Since this is not the case at JPG sites, no further analysis other than the metals confirmation testing at excavation sites is necessary.**

**In addition, if antimony analyses had been qualified based solely on the USEPA National Functional Guidelines, it would be qualified as usable.**

6. Please include the actual number for each Preliminary Remediation Goal (PRG) or cleanup target level for soils/sediments and maximum contaminant level (MCL) established under the Safe Drinking Water Act for groundwater.

**Response: Comment is incorporated.**

## **SPECIFIC COMMENTS**

1. **Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring), Page 13:** This section indicates that groundwater will be monitored for volatile organic compounds (VOCs) and potentially chromium. As indicated in Specific Comment 4 in Appendix A1 of the Draft PP, U.S. EPA made recommendations for perchlorate sampling of the groundwater at Sites 3/4 when commenting on the RI and FS documents for JPG. However, the Army has responded on several occasions (including Appendix A1) that current Department of Defense (DoD) policy will not allow for perchlorate sampling at Sites 3/4. The Army's response regarding DoD's policy regarding sampling for perchlorate is duly noted. However, U.S. EPA's original comment on this issue still stands. The proposed long-term groundwater monitoring program for Sites 3/4 should include perchlorate as a sampling parameter.

**Response: The long-term groundwater monitoring program will be identified in the RA Work Plan. This comment will be addressed at that time.**

2. **Alternatives for Groundwater - Site 12A, Page 20:** This section explains that two monitoring wells will be installed and screened across the till/loess interface, and the new wells will be incorporated into the preferred remedy for Site 12A. The Meeting Minutes provided in Appendix A4 of the Draft PP indicate that U.S. EPA agreed with the installation of the two till/loess interface wells. However, as indicated by U.S. EPA representatives during the meeting, the installation of a total of three monitoring wells screened across the till/loess interface is preferred. Two wells will not provide an adequate indication of long-term groundwater flow conditions in the aquifer at the till/loess interface.

**Response: Three till/loess wells were installed as agreed for Site 12B. However, for Site 12A, two wells were installed as agreed during the meeting at JPG (refer to MWH Resolution of Geology Issues in Appendix A4).**

3. **Evaluation of Alternatives for Site 14, Page 29:** This section implies that arsenic will be the only parameter analyzed in the future groundwater monitoring program. However, as indicated in Specific Comment 10 in Appendix A1 of the Draft PP, lead and cobalt were also detected in groundwater samples collected from monitoring wells at Site 14. Therefore, it is recommended that total metals analyses be included in the future groundwater monitoring program for Site 14, with the specific metals to be analyzed agreed upon by Army, U.S. EPA and Indiana Department of Environmental Management (IDEM) personnel at a later date.

**Response: The long-term groundwater monitoring program will be presented in the RA Work Plan. This comment will be addressed at that time.**

4. **Sites 21A/30 - Building 204 Temporary Storage Area, Page 30:** This section indicates that a variety of pesticides and herbicides were stored in Building 204. As indicated in Specific Comment 11 in Appendix A1 of the Draft PP, U.S. EPA recommended soil sampling under the Building 204 concrete slab to confirm the extent of pesticide contamination at the site. The Army's response, as indicated in Appendix A1, states that the Army will not perform additional investigation and includes the Army's rationale for not collecting additional samples. However, the condition of the concrete slab in Building 204 was discussed during the July 29-31, 2003 meeting at JPG, attended by representatives of the Army, U.S. EPA and IDEM. It was agreed during the meeting that if the concrete slab contains cracks that could have allowed pesticides/herbicides to migrate to underlying soils, the soil beneath these cracks would be further investigated. The Draft PP should be revised to state that the Army will evaluate the integrity of the concrete slab within Building 204, and if the slab contains cracks that could have allowed past spills of liquids to migrate to soils below the slab, the soils will be sampled and analyzed for the presence of pesticides and herbicides.

It should be noted that although a concrete slab currently exists in Building 204, the Draft PP states: "the site may be used as residential by the future landowner." It is therefore important that the soils underlying the slab at Building 204 be properly characterized for potential



contamination before the property is transferred, as the future landowner may remove the building and slab, and use the former building site for residential purposes.

**Response: The text has been modified to say that Building 204 will not be used for residential, although nearby property may be used as residential. The concrete has been inspected and was found to be in good condition, thus no sampling of underlying soils is necessary.**



Joseph E. Kernan  
Governor

Lori F. Kaplan  
Commissioner

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(800) 451-6027  
www.in.gov/idem

December 15, 2003

Mr. Paul D. Cloud  
U.S. Army SBCCOM  
5183 Blackhawk Road  
Aberdeen Proving Ground, MD 21010-5424

Dear Mr. Cloud:

Re: Draft Proposed Plan for Jefferson  
Proving Ground, Site #1300006

Staff of the Indiana Department of Environmental Management (IDEM) have reviewed the Draft Proposed Plan (PP) for the Jefferson Proving Ground (JPG) site. The proposed remedial alternatives appear to be acceptable for the contaminants at the various sites, however, IDEM staff have the following comments that must be addressed:

**Comments:**

1. On Page 4, in the second list of bulleted items, the word "of" needs to be removed in the first bulleted item.
2. On Page 4, in the second list of bulleted items, in the last bulleted item, it should be noted that the inclusion and evaluation of the "No Further Action (NFA) alternative" is a statutory requirement.
3. Beginning on Page 12, the text references that contaminant concentrations will be remediated to levels that "... are on average below USEPA Region 9 residential soil PRGs." A brief explanation or definition of this statement should be included.
4. On Page 14, in the Site 7/21B section, in the third paragraph, the word "was" should be inserted between the words "removal" and "performed."
5. On Page 22, under Summary of Potential Risk for Site 12B, in the second paragraph, the word "and" is misplaced in the last sentence.
6. Many of the plans fail to include provisions for ending groundwater monitoring. Plans for sites 3/4, 7/21B, and 14 fail to present or indicate a goal, such as maximum contaminant levels (MCLs) or other human health standard, that would signify the end of groundwater monitoring.
7. Plans for sites 12A, 12B, and 12C identify an end point for groundwater monitoring, applicable or relevant and appropriate requirements (ARARs), but fail to present specifics on how it is to be measured. The text needs to identify the number of consecutive monitoring events and duration between monitoring events that must be below ARARs in order for it to be acceptable for monitoring to cease.

8. The contaminant of concern (COC) in the groundwater at Site 7/21B is arsenic. IDEM's geologists believe arsenic may be naturally occurring due to local geologic formations and conditions. If a deed restriction is added and enforced, then a complete exposure pathway will likely not exist. The 10 years of monitoring proposed in the document is only relevant if a deed restriction prohibiting wells can not be applied, maintained, and enforced. Otherwise, an annual re-evaluation of the groundwater monitoring results should be added, to determine whether the site qualifies for NFA. Limiting the duration of monitoring to 10 years is acceptable provided the data collected supports it. Additional background sampling, including the installation of additional up-gradient monitoring wells, could support an NFA determination with this monitoring duration.

**Conclusion:**

The proposed plan is acceptable, provided the proposals involving groundwater monitoring are enhanced as indicated in the above comments.

If you have any questions concerning this letter, feel free to contact me at (317) 234-0354 or via email at [kherron@dem.state.in.us](mailto:kherron@dem.state.in.us).

Sincerely,



Kevin D. Herron, Project Manager  
Federal Programs Section  
Office of Land Quality

KDH:tr

cc: Karen Mason-Smith, U.S. EPA Region V  
Rex Osborn, IDEM

2/2-Enl

## RESPONSES TO IDEM DECEMBER 15, 2003 COMMENTS

### Draft Proposed Plan Jefferson Proving Ground Madison, Indiana

Following are the USACE's response to comments presented in the Indiana Department of Environmental Management (IDEM) letter dated December 15, 2003 associated with the Draft Proposed Plan dated October 2003 for the Jefferson Proving Ground. The following numbering system corresponds to the numbers used in the IDEM letter.

1. *On Page 4, in the second list of bulleted items, the word "of" needs to be removed in the first bulleted item.*

**Response:** Comment is incorporated.

2. *On Page 4, in the second list of bulleted items, in the last bulleted item, it should be noted that the inclusion and evaluation of the "No Further Action (NFA) alternative" is a statutory requirement.*

**Response:** Comment is incorporated.

3. *Beginning on Page 12, the text references that contaminant concentrations will be remediated to levels that "...are on average below USEPA Region 9 residential soil PRGs." A brief explanation or definition of this statement should be included.*

**Response:** Comment is incorporated.

4. *On Page 14, in the Site 7/21B section, in the third paragraph, the word "was" should be inserted between the words "removal" and "performed.."*

**Response:** Comment is incorporated.

5. *On Page 22, under Summary of Potential Risk for Site 12B, in the second paragraph, the word "and" is misplaced in the last sentence..*

**Response:** Comment is incorporated.

6. *Many of the plans fail to include provisions for ending groundwater monitoring. Plans for sites 3/4, 7/21B, and 14 fail to present or indicate a goal, such as maximum contaminant levels (MCLs) or other human health standard, that would signify the end of groundwater monitoring.*

**Response:** The goals (PRG or MCL) have been added to the RAO section for each site.

7. *Plans for sites 12A, 12B, and 12C identify an end point for groundwater monitoring, applicable or relevant and appropriate requirements (ARARs), but fail to present specifics on how it is to be measured. The text needs to identify the number of consecutive monitoring events and duration between monitoring events that must be below ARARs in order for it to be acceptable for monitoring to cease.*

**Response:** The long-term groundwater monitoring program will be identified in the RA Work Plan. This comment will be addressed at that time.

8. *The contaminant of concern (COC) in the groundwater at Site 7/21B is arsenic. IDEM's geologist believe arsenic may be naturally occurring due to local geologic formations and conditions. If a deed restriction is added and enforced, then a complete exposure pathway will likely not exist. The 10 years of monitoring proposed in the document is only relevant if a deed restriction prohibiting wells can not be applied, maintained, and enforced. Otherwise, an annual re-evaluation of the groundwater monitoring results should be added, to determine whether the site qualifies for NFA. Limiting the duration of monitoring to 10 years is acceptable provided the data collected supports it. Additional background sampling, including the installation of additional up-gradient monitoring wells, could support an NFA determination with this monitoring duration.*

**Response:** Comment noted. The monitoring plan will be identified in the RA Workplan. This comment will be addressed at that time.

**A6**

**Comments and Responses on the Draft-Final Proposed Plan**

## RESPONSES TO IDEM COMMENTS

**Draft-Final Proposed Plan  
Dated January 27, 2004  
Jefferson Proving Ground  
Madison, Indiana**

Following are the USACE's response to comments presented in the Indiana Department of Environmental Management (IDEM) e-mails from Kevin Herron dated February 09, 2004 and February 06, 2004 associated with the Draft-Final Proposed Plan for the Jefferson Proving Ground in Madison, Indiana. The following numbering system corresponds to the numbers used in the IDEM e-mail.

### **February 9, 2004 E-Mail Comments**

1. *On Page 2, under Purpose and Scope, the term ROD is introduced. It needs to be defined, i.e., Record of Decision. It also needs a brief explanation of what it is. Tell the people that it is the decision document that is signed by the regulatory agencies for concurrence on the selected remedies. Give the official description if possible.*

**Response:** The first occurrence of the term ROD is on Page 1, where it is defined. The brief explanation recommended in the above comment has been added on that page.

2. *On page 3, under Facility Background, in the last sentence of the second paragraph, maybe you should end the sentence with something like, "for its intended or restricted reuse (i.e., industrial/commercial)."*

**Response:** Comment is incorporated.

3. *On page 4, at the top of the page in the sentence beginning "Only 15 sites were . . . ," were they brought forward based on a residential use or exposure scenario? If so, then state it so the public can feel comfortable that residential criterion was used to bring the site forward.*

**Response:** Comment is incorporated.

4. *On page 9, under Harberts Creek Surface Waters and Sediments, in the second paragraph, the last sentence identifies bypassing from or of the sewage treatment plant. Give a short or brief explanation of why there were discharges. Possible that*

*during heavy rain events and very high flow, the sewer bypass occurred, however, there would also be a large degree of dilution too.*

**Response: Comment is incorporated.**

5. *In general for groundwater, mostly due to the issue on Chromium VI, but also in other areas, there is statement that Chromium [or other metals] may be remediated. The Chromium VI is on page 13 in the bulleted item. There are couple reasons I bring up the concern over remediation of the COCs [metals in particular]. Metals are very difficult to remediate. They are in the shallow groundwater. The public may be confused by the usage of the word "remediated." Also, the biggest issue would be that when we put this text into the ROD, I am concerned with how the remedy is presented, because I do not want to get into a ROD Amendment later if the metals [i.e., Chromium VI] is determined to be background or naturally occurring. Is a very general issue. I would rather state that if it is determined through monitoring that any of the metals for any groundwater site are background or naturally occurring, then further monitoring would be unnecessary and cease. Like I said, this is the difficult one. Maybe it is covered under the remedial objectives too.*

**Response: Comment noted. The text will be reviewed and modified to indicate that COCs in groundwater will be monitored to determine if they are background or naturally occurring. If it is determined through monitoring that any of the metals are background or naturally occurring, then further monitoring would be unnecessary and cease. If it is determined through monitoring that they are not background or naturally occurring, COCs will be addressed to mitigate risk. However, this does not necessarily imply that groundwater will be remediated to achieve a specific MCL or PRG.**

6. *On page 16 in the second paragraph, in the last sentence, it should possibly end with something like this, " unless determined to be naturally occurring due to . . . (soil types, geologic conditions, ...)."*

**Response: Comment is incorporated.**

7. *In Tables 4 and 5, I would probably have reduced the score for Alternative 3 in both tables for either the column on "Reduction of . . ." or "Implementability" due to the difficulties with removal of the groundwater. Maybe even reduce the score slightly for both columns for Alternatives 3 in Table 4 and 5*

**Response: Comment is incorporated.**



**February 6, 2004 E-Mail Comments**

1. *Page 6, Modifying Criteria, Bullet 1: "State acceptance indicates whether the State concurs..." The document seldom uses the title "State". Usually the document refers to "IDEM". It would more in line with the rest of the document to say "IDEM acceptance indicates whether the State concurs..."*

**Response: Comment is incorporated.**

2. *Page 12, Remedial Objectives--Sites 3/4: "...soils and groundwater will be remediated in the event that the site is used as residential." This is incorrect. Remedial action is currently planned to take place in the near future, not at some unspecified time if the site is used for residential property. This could be changed to "...soils and groundwater will be remediated so the site can be used as residential."*

**Response: Comment is incorporated.**

3. *Table 1, Comparative ...yadda, yadda: The next to last column is labeled "State Acceptance" but both IDEM and the USEPA are noted in the column. The column heading would be more correct if changed to "Regulatory Acceptance" or just "Acceptance"*

**Response: Comment is incorporated.**



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

REPLY TO ATTENTION OF:

**SR-6J**

February 6, 2004

ATTN: Mr. Paul Cloud, BRAC Environmental Coordinator  
U.S. Army Soldier and Biological Chemical Command  
5183 Blackhawk Road  
Aberdeen Proving Ground, MD 21005-5424

Subject: Review Comments on the *Draft-Final Proposed Plan for Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14 and 21A/30 at Jefferson Proving Ground in Madison, Indiana, dated January 27, 2004*

Dear Mr. Cloud:

The United States Environmental Protection Agency Region 5 (U.S. EPA) has reviewed the Draft-Final Proposed Plan for the Jefferson Proving Ground (JPG) site in Madison, Indiana (Draft-Final PP). U.S. EPA focused its review on whether the responses to comments provided by the United States Army Corps of Engineers (USACE) and the revisions contained in the Draft-Final PP adequately address U.S. EPA's December 2, 2003 comments on the Draft PP (dated October 2003).

Based on the revisions in the Draft-Final PP, it is still not clear how USACE plans to address U.S. EPA's unresolved comments on the Remedial Investigation (RI) sites designated by the USACE for no further action (NFA). As indicated in our evaluation of General Comment 1, it appears that the USACE plans to incorporate these sites into an NFA section within the Record of Decision (ROD) that will follow the Proposed Plan that is currently being reviewed. However, the USACE-designated NFA sites are not addressed in the Draft-Final PP, and incorporating the sites into the subsequent ROD may not allow for an adequate discussion of U.S. EPA's unresolved comments on the sites. Therefore, in General Comment 1, U.S. EPA has recommended that the ROD referenced in the "Facility Background" section of the Draft-Final PP address only the 15 sites that were brought forward from the RI to the Feasibility Study (i.e., the sites that are currently addressed in the Draft-Final PP). The unresolved comments on some of the NFA sites should be resolved on a separate schedule and then another ROD for the NFA sites can be prepared.

Thank you for the opportunity to review the Draft-Final PP. This comment letter is being provided to you via electronic mail for your convenience. Please call me at (312) 886-6150 if you have any questions.

Sincerely,

/

Karen Mason-Smith/s/  
Remedial Project Manager  
Superfund Division

Enclosure

cc: B. Evens, Army COE-Louisville  
K. Herron, IDEM  
B. Iverson, MWH  
R. Young, TechLaw Inc.  
R. Hill, JPG RAB  
D. Henshel, JPG RAB TAPP  
J. DeWitt, JPG RAB TAPP

**REVIEW OF THE DRAFT-FINAL PROPOSED PLAN  
DATED JANUARY 27 2004**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

**Submitted by:**

**Ms. Karen Mason-Smith  
EPA Work Assignment Manager  
U.S. Environmental Protection Agency  
Region 5 (SR-6J)  
77 W. Jackson Boulevard  
Chicago, Illinois 60604**

**Submitted to:**

**Mr. Paul Cloud, BEC  
U.S. Army Soldier and  
Biological Chemical Command  
5183 Blackhawk Road  
Aberdeen Proving Ground, MD 21005-5424**

**February 6, 2004**

**REVIEW OF THE DRAFT-FINAL PROPOSED PLAN  
DATED JANUARY 27 2004**

**JEFFERSON PROVING GROUND  
MADISON, INDIANA**

The United States Army Corps of Engineers' (USACE) responses to U.S. EPA's comments (dated December 2, 2003) on the Draft Proposed Plan (Draft PP), contained in Appendix A5 of the Draft-Final Proposed Plan (Draft-Final PP) dated January 27, 2004, and the revisions in the Draft-Final PP have been reviewed to determine if they adequately address U.S. EPA's comments on the Draft PP. The comment numbering system below follows the order presented in U.S. EPA's December 2, 2003 comments on the Draft PP.

**GENERAL COMMENTS**

1. **This comment appears to have been partially addressed.** The title of the Draft Final PP has been revised to reflect the 15 Remedial Investigation (RI) sites that were brought forth into the Feasibility Study (FS). However, the Draft-Final PP section titled "Facility Background" states that "The ROD will contain a NFA section summarizing all the NFA sites." As stated in the original comment, U.S. EPA and the community restoration advisory board (RAB) still have many unresolved comments on some of the RI sites that the USACE recommended for no further action (NFA). It is recommended that the Record of Decision (ROD) referenced in the "Facility Background" section of the Draft-Final PP address only the 15 FS sites. The unresolved comments on some of the RI sites recommended by USACE for NFA should be resolved and then a separate ROD for the NFA sites can be prepared.
2. **This comment appears to have been adequately addressed.**
3. **This comment does not appear to have been adequately addressed.** The response and Draft-Final PP revisions are not considered adequate for the following reasons:
  - The first full sentence on page 13 states: "Confirmation sampling will be performed for metals, including antimony." However, the previous sentence in the text indicates that soils will be remediated to address elevated concentrations of benzo(a)pyrene and 2,3,7,8-TCDD (in addition to zinc). It is unclear why confirmation sampling is not discussed for these organic compounds. The Final Proposed Plan (Final PP) should provide clarification that confirmation sampling will include analyses for benzo(a)pyrene and 2,3,7,8-TCDD.
  - The last paragraph on page 12 indicates that benzo(a)pyrene (as well as other chemicals) will be remediated to levels that are below U.S. EPA Region 9 Preliminary Remediation Goals (Region 9 PRGs) or background concentrations, whichever is higher. However, background concentrations for organic compounds such as benzo(a)pyrene are not typically established as remediation goals. The Final PP should clarify that benzo(a)pyrene will be remediated to the Region 9 PRG levels, and not to background concentrations.

- There appears to be a typographical error on page 12, in the discussion of Sites 3/4. In the second bullet item, the Region 9 PRG for chromium (VI) in tap water is listed as 100 ug/L. However, the Region 9 PRG for chromium (VI) in tap water is 110 ug/L. This should be corrected or clarified in the Final PP.
4. **This comment appears to have been adequately addressed.** The Draft-Final PP provides the appropriate Maximum Contaminant Levels (MCLs) for the constituents detected during the RI and FS activities. However, it is expected that long-term groundwater monitoring conducted during the Remedial Design/Remedial Action (RD/RA) activities will include regular sampling and analysis for the breakdown products of the constituents detected above MCLs. In addition, remediation should not be considered complete until all of the breakdown products present in the groundwater are at concentrations below appropriate risk-based standards. For example, sampling and analysis for 1,1-dichloroethane and 1,1-dichloroethene should be conducted at Site 12A, where 1,1,1-trichloroethane was detected at concentrations above MCLs. As indicated in the original comment, it is assumed that the details of the long-term monitoring plan will be addressed during the RD/RA design.
  5. **This comment does not appear to have been adequately addressed.** The response and Draft-Final PP revisions are not considered adequate for the following reasons:
    - The response to this comment states that “Antimony is not a contaminant of concern unless it was produced at the subject site by the industrial world, such as in tanning industries and other like industries. Since this is not the case at JPG sites, no further analysis other than the metals confirmation testing at excavation sites is necessary.” However, antimony is present in some small arms ammunition (SAA), and can constitute up to approximately 10% of the “slug” material within certain SAA bullets. The history of each of the sites at JPG should be evaluated to determine if SAA was shot or disposed of at any of the sites. These sites, at a minimum, should be characterized for the potential presence of antimony.
    - The response states that antimony will be included in confirmation sampling performed at sites involving soil excavation and confirmation testing for metals. However, while metal-contaminated soils will be remediated from the Site 4 trench area (page 12, third bullet item), the Draft-Final PP does not discuss confirmation sampling for metals, nor antimony. The Final PP should indicate that confirmation samples will be collected for metals (e.g., lead, barium and cadmium) and antimony from the Site 4 trench area.
    - The response states that “if antimony had been qualified based solely on the USEPA National Functional Guidelines, it would be qualified as usable.” The rationale for this response is unclear. If the data were rejected by a qualified person and the rejected antimony data were used to conduct data analysis in the JPG RI Reports, then the statement in the response does not influence the usability of the antimony data. Therefore, the rejected antimony data is still considered unusable for making risk-based decisions, as specified in the JPG RI Reports.
  6. **This comment appears to have been adequately addressed.**

## **SPECIFIC COMMENTS**

1. **This comment appears to have been adequately addressed.**
2. **This comment appears to have been adequately addressed.** Although three monitoring wells screened across the till/loess interface would still be preferred at Site 12A, data exists regarding historic flow conditions at the site and flow conditions will be further addressed in the long-term monitoring program for Site 12A. Thus, the need for additional wells at Site 12A can be evaluated based on the results of the long-term monitoring program.
3. **This comment appears to have been adequately addressed.**
4. **This comment appears to have been adequately addressed.**

6-END

## RESPONSES TO USEPA COMMENTS

**Draft-Final Proposed Plan  
Dated January 27, 2004  
Jefferson Proving Ground  
Madison, Indiana**

Following are the USACE's response to comments presented in the U.S. Environmental Protection Agency (USEPA) e-mail from Karen Mason-Smith dated February 06, 2004 associated with the Draft-Final Proposed Plan dated January 27, 2004 for the Jefferson Proving Ground in Madison, Indiana.

The United States Army Corps of Engineers' (USACE) responses to U.S. EPA's comments (dated December 2, 2003) on the Draft Proposed Plan (Draft PP), contained in Appendix A5 of the Draft-Final Proposed Plan (Draft-Final PP) dated January 27, 2004, and the revisions in the Draft-Final PP have been reviewed to determine if they adequately address U.S. EPA's comments on the Draft PP. The comment numbering system below follows the order presented in U.S. EPA's December 2, 2003 comments on the Draft PP.

### GENERAL COMMENTS

1. ***This comment appears to have been partially addressed.** The title of the Draft Final PP has been revised to reflect the 15 Remedial Investigation (RI) sites that were brought forth into the Feasibility Study (FS). However, the Draft-Final PP section titled "Facility Background" states that "the ROD will contain a NFA section summarizing all the NFA sites". As stated in the original comment, U.S. EPA and the community restoration advisory board (RAB) still have many unresolved comments on some of the RI sites that the USACE recommended for no further action (NFA). It is recommended that the Record of Decision (ROD) referenced in the "Facility Background" section of the Draft-Final PP address only the 15 FS sites. The unresolved comments on some of the RI sites recommended by USACE for NFA should be resolved and then a separate ROD for the NFA sites can be prepared.*

**Response: The NFA sites will be included in the ROD as an additional section with a summary of when and why the sites were removed from the RA process and deemed NFA.**

2. ***This comment appears to have been adequately addressed.***

**Response: No response necessary.**



3. ***This comment does not appear to have been adequately addressed. The response and Draft-Final PP revisions are not considered adequate for the following reasons:***

- *The first full sentence on page 13 states: "[C]onfirmation sampling will be performed for metals, including antimony." However, the previous sentence in the text indicates that soils will be remediated to address elevated concentrations of benzo(a)pyrene and 2,3,7,8-TCDD (in addition to zinc). It is unclear why confirmation sampling is not discussed for these organic compounds. The Final Proposed Plan (Final PP) should provide clarification that confirmation sampling will include analyses for benzo(a)pyrene and 2,3,7,8-TCDD.*

**Response: Comment is incorporated.**

- *The last paragraph on page 12 indicates that benzo(a)pyrene (as well as other chemicals) will be remediated to levels that are below U.S. EPA Region 9 Preliminary Remediation Goals (Region 9 PRGs) or background concentrations, whichever is higher. However, background concentrations for organic compounds such as benzo(a)pyrene are not typically established as remediation goals. The Final PP should clarify that benzo(a)pyrene will be remediated to the Region 9 PRG levels, and not to background concentrations.*

**Response: Comment is incorporated.**

- *There appears to be a typographical error on page 12, in the discussion of Sites 3/4. In the second bullet item, the Region 9 PRG for chromium (VI) in tap water is listed as 100 ug/L. However, the Region 9 PRG for chromium (VI) in tap water is 110 ug/L. This should be corrected or clarified in the Final PP.*

**Response: Comment is incorporated.**

4. ***This comment appears to have been adequately addressed. The Draft-Final PP provides the appropriate Maximum Contaminant Levels (MCLs) for the constituents detected during the RI and FS activities. However, it is expected that long-term groundwater monitoring conducted during the Remedial Design/Remedial Action (RD/RA) activities will include regular sampling and analysis for the breakdown products of the constituents detected above MCLs. In addition, remediation should not be considered complete until all of the breakdown products present in the groundwater are at concentrations below appropriate risk-based standards. For example, sampling and analysis for 1,1-dichloroethane and 1,1-dichloroethene should be conducted at Site 12A, where 1,1,1-trichloroethane was detected at concentrations above MCLs. As indicated in the original comment, it is assumed that the details of the long-term monitoring plan will be addressed during the RD/RA design.***

**Response: No response necessary.**

5. ***This comment does not appear to have been adequately addressed. The response and Draft-Final PP revisions are not considered adequate for the following reasons:***

- The response to this comment states that “[Antimony is not a contaminant of concern unless it was produced at the subject site by the industrial world, such as in tanning industries and other like industries. Since this is not the case at JPG sites, no further analysis other than the metals confirmation testing at excavation sites is necessary.] However, antimony is present in some small arms ammunition (SAA), and can constitute up to approximately 10% of the “slug” material within certain SAA bullets. The history of each of the sites at JPG should be evaluated to determine if SAA was shot or disposed of at any of the sites. These sites, at a minimum, should be characterized for the potential presence of antimony.*

**Response: Small arms ammunition was not used at sites South of the Firing Line, therefore no additional antimony characterization will be performed. Confirmation testing at Soils RA sites will include antimony with metals testing.**

- The response states that antimony will be included in confirmation sampling performed at sites involving soil excavation and confirmation testing for metals. However, while metal-contaminated soils will be remediated from the Site 4 trench area (page 12, third bullet item), the Draft-Final PP does not discuss confirmation sampling for metals, nor antimony. The Final PP should indicate that confirmation samples will be collected for metals (e.g., lead, barium and cadmium) and antimony from the Site 4 trench area.*

**Response: Comment is incorporated.**

- The response states that “[i]f antimony had been qualified based solely on the USEPA National Functional Guidelines, it would be qualified as usable”. The rationale for this response is unclear. If the data were rejected by a qualified person and the rejected antimony data were used to conduct data analysis in the JPG RI Reports, then the statement in the response does not influence the usability of the antimony data. Therefore, the rejected antimony data is still considered unusable for making risk-based decisions, as specified in the JPG RI Reports.*

**Response: Comment noted.**

6. ***This comment appears to have been adequately addressed.***

**Response: No response necessary.**

## SPECIFIC COMMENTS

1. *This comment appears to have been adequately addressed.*

**Response:** No response necessary.

2. *This comment appears to have been adequately addressed. Although three monitoring wells screened across the till/loess interface would still be preferred at Site 12A, data exists regarding historic flow conditions at the site and flow conditions will be further addressed in the long-term monitoring program for Site 12A. Thus, the need for additional wells at Site 12A can be evaluated based on the results of the long-term monitoring program.*

**Response:** No response necessary.

3. *This comment appears to have been adequately addressed.*

**Response:** No response necessary.

4. *This comment appears to have been adequately addressed.*

**Response:** No response necessary.